MODERN MECHANIX

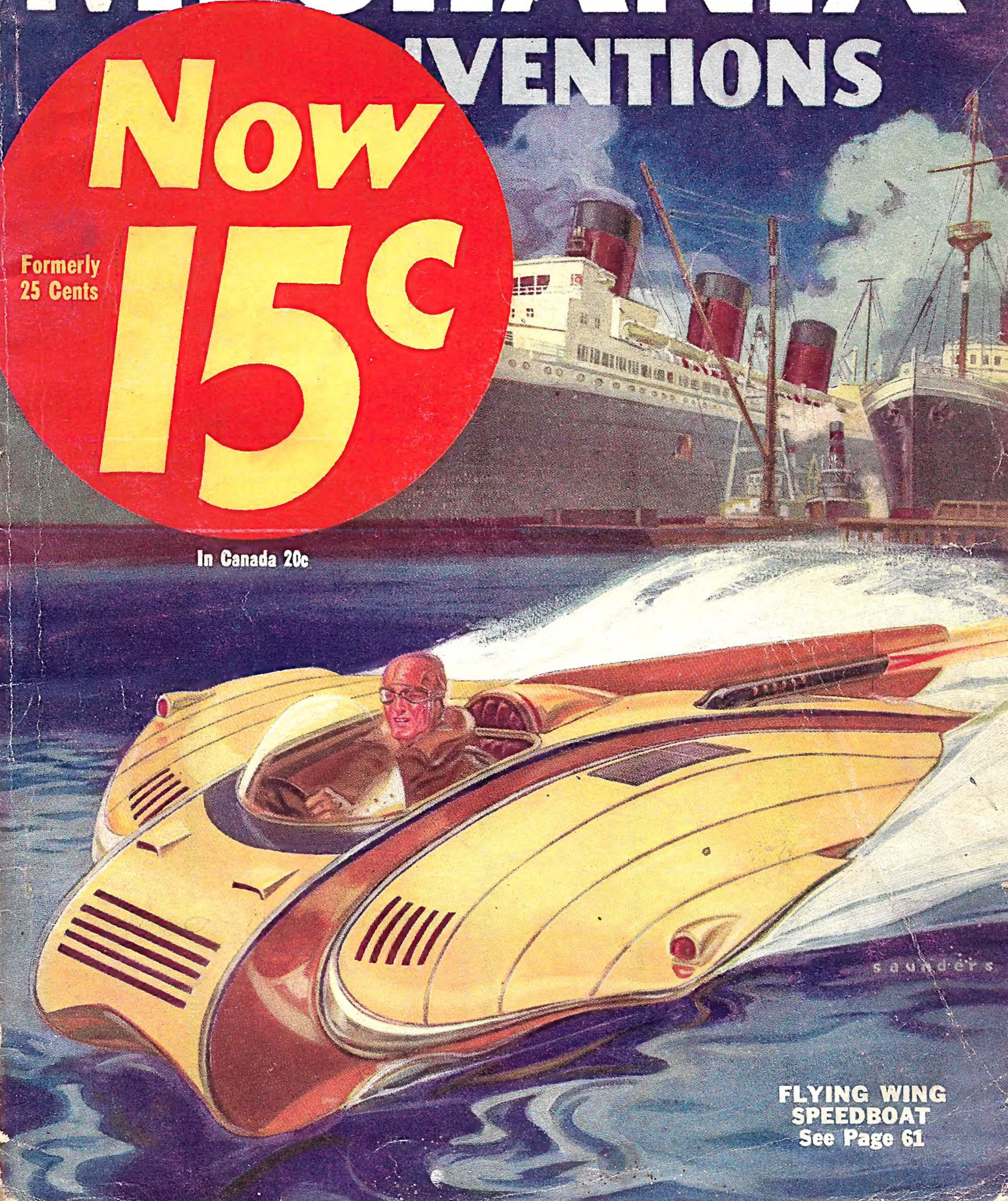
February

VENTIONS

Now 15c

Formerly 25 Cents

In Canada 20c



FLYING WING SPEEDBOAT
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MODERN MECHANIX AND INVENTIONS

NOW 15 CENTS

FEBRUARY 193

Sensational Tire Repair Discovery!

Re-Treads Tires

FOR AS LOW AS **75** CENTS

Repairs Worn Spots for a Few Pennies

Pays **AGENTS** UP TO **$6** AN HOUR

SPREAD-A-TREAD

New, sensational discovery called SPREAD-A-TREAD. Covers old worn tires with a new, tough, flexible, long-wearing tread for as low as 75c. Repairs a worn place for a few pennies. At least 2000 additional miles GUARANTEED. Many Spread-A-Tread applications wear 6,000 to 12,000 miles. An amazing opportunity for agents to make up to $6.00 in an hour. Rich territories now being allotted—act today to reserve yours.

SPREADS on with a knife—Dries over night

Anyone can apply Spread-A-Tread. An old knife is all you need. No other tools necessary. It spreads on like spreading butter on bread. Dries over night—tough, flexible and long-wearing. CAN'T come off.

Ends Costly Tire Repairs — Helps Prevent Accidents

SPREAD-A-TREAD ends costly vulcanizing or re-treading. Saves buying new tires. Helps prevent skidding, punctures, blow-outs and accidents due to poor tires. Seals holes and cracks. Rebuilds tire from outside without taking off car or even letting out the air. Reinforces weak spots. Vulcanizes itself to the old tire so that it cannot crack or peel off. Saves delays and repairs. Protects fabric against water, grit, rot and wear. Makes driving safer.

Made $1,734 in Two Weeks

Harry Gillig, of Kansas, forms his own sales company for distributing SPREAD-A-TREAD. In two weeks he sold 7 gross giving him a profit of $1,734. You have the same opportunity.

MAIL COUPON FOR FREE SAMPLE

Mail Coupon for FREE demonstration sample showing toughness and flexibility and special agent's exclusive territory offer. I will show you how other men are making up to $6.00 in an hour with this amazing product that is bought eagerly by owners of motor cars and trucks. Mail coupon today. Wm. Stewart, President.

PLASTIC RUBBER COMPANY OF AMERICA
Dept. B-235, E. Court St. Cincinnati, O.

Good for FREE Sample

Wm. Stewart, Pres., Plastic Rubber Co. of America,
Dept. B-235, E. Court St., Cincinnati, Ohio.

I am interested in SPREAD-A-TREAD. You may send me the Free Sample to prove its flexibility and toughness, also tell me how other men are making up to $6.00 in an hour.

Name ....
Address ....
City .... State ....
Territory interested in ....

So you're going BACK TO WORK!

THAT'S FINE! And more good news is that improved business conditions are sending thousands of other men back to work.

But don't let your enthusiasm dim the facts. *Business today, and from now on, has a new standard of service.* It is a standard of efficiency —*of training*—and to ignore it is inviting another long stretch of unemployment.

For your own sake, man, for your family's sake, do not flirt with this disaster!

Especially foolish when you can acquire so easily the training you must have . . . when you can make yourself more valuable on your job by devoting a small portion of your spare time to study. In years past millions of men have come to International Correspondence Schools for this training. Today, with its unusual conditions, is bringing many of these men back for *additional* training, to meet and solve the problems of a new day—and many thousands who have decided to face the facts and assure their own futures. Will you face the facts? Do you want to assure your future? Then this coupon is a challenge to you! Why not mark and mail it—right now? *If desired, you can arrange to complete the course of your choice through easy monthly payments.*

INTERNATIONAL CORRESPONDENCE SCHOOLS

★ *"The Universal University"* BOX 2319-S, SCRANTON, PENNA. ★

Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject *before* which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

☐ Architect
☐ Architectural Draftsman
☐ Building Estimating
☐ Wood Millworking
☐ Contractor and Builder
☐ Structural Draftsman
☐ Structural Engineer
☐ Electric Wiring
☐ Electrical Engineer
☐ Electric Lighting
☐ Welding, Electric and Gas
☐ Reading Shop Blueprints

☐ Telegraph Engineer
☐ Telephone Work
☐ Mechanical Engineer
☐ Mechanical Draftsman
☐ Machinist ☐ Toolmaker
☐ Patternmaker
☐ Pipefitter ☐ Tinsmith
☐ Bridge Engineer
☐ Bridge and Building Foreman
☐ Gas Engines ☐ Diesel Engines
☐ Aviation Engines
☐ Automobile Mechanic

☐ Plumbing ☐ Steam Fitting
☐ Heating ☐ Ventilation
☐ Sheet Metal Worker
☐ Steam Engineer
☐ Steam Electric Engineer
☐ Civil Engineer
☐ Surveying and Mapping
☐ Refrigeration
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☐ R. R. Section Foreman
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☐ Air Brakes ☐ Train Operation
☐ Highway Engineering
☐ Chemistry ☐ Pharmacy
☐ Coal Mining Engineer
☐ Navigation
☐ Boilermaker
☐ Textile Overseer or Supt.
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☐ Woolen Manufacturing
☐ Agriculture ☐ Fruit Growing
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BUSINESS TRAINING COURSES

☐ Business Management
☐ Office Management
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☐ Personnel Management
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☐ Cost Accountant
☐ C. P. Accountant
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☐ Illustrating ☐ Cartooning
☐ Lumber Dealer

Name..*Age*..................*Address*..

City..*State*..................*Occupation*..

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

February,
1933
VOLUME IX
NUMBER 4

MODERN MECHANIX AND INVENTIONS

DONALD COOLEY
Editor

PRICE 15 CENTS
20 Cents in Canada

NEW PRICE 15 CENTS! Beginning with this issue, Modern Mechanix and Inventions, always a striking news stand value at 25 cents per copy, comes to you for only 15 cents. (In Canada, 20 cents.) The yearly subscription rate in the United States and possessions is now $1.50; in Canada, $2.25; Foreign, $2.00. A subscription assures you of receiving your copy regularly each month.

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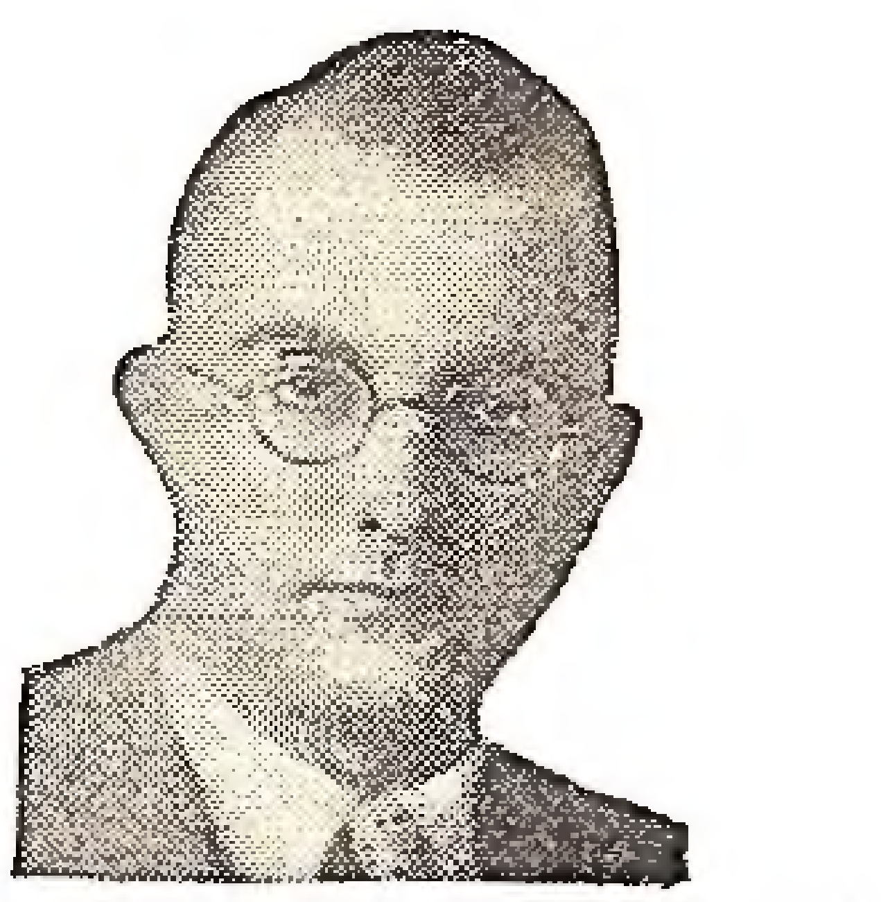
Published monthly by Modern Mechanix Publishing Co., at 529 7th Street So., Minneapolis, Minnesota. MODERN MECHANIX AND INVENTIONS entered as second class matter September 20th, 1928, at the Post Office, Minneapolis, Minnesota, under the act of March 3rd, 1879. Jack Smalley, Managing Editor. Copyright 1932. Advertising Offices: Chicago office, 35 East Wacker Drive (Phone State 2955); New York office, 52 Vanderbilt Avenue, Room 1603 (Phone Murray Hill 2-1555). All manuscripts should be addressed to our editorial office at 529 So. 7th Street, Minneapolis, Minn. Manuscripts will not be returned unless accompanied by return postage. Advertising forms close on the 20th of the third preceding month. Price 15 cents a copy; $1.50 a year in the United States and possessions. In Canada, 20c per copy, per year $2.25. Other Postal Unions, $2.00 per year. Printed in U. S. A.

Worth $5,000 To Him
"I wouldn't take $5,000 for what you've done for me," writes C. B. Sterling. "Your training has actually increased my income over 900%." Shortly after enrolling, he led the sales force of his company.



A 300% Increase!
From $75 a month to $300 and more per month—that's the jump M. B. Scholes made thru N. S. T. A. Credits N. S. T. A. training with his success and N. S. T. A. Employment Department for his present big pay job.

$5,000 A Year!
Ask J. A. Ferland if N. S. T. A. training pays. A French-Canadian railroad man—little education in English, N. S. T. A. training won him a sales managership at $5,000 a year to start.

Earns 2 Years Pay In 3 Months
J. M. Huppert, a $23 a week plumber's apprentice, found selling furs easier and more profitable than fixing leaks after N. S. T. A. training. In his first 3 months he had made more money than in two years at his old job.

Last Year's Pay Looks Like Small Change to These Men Today!

Doubled His Pay
A. Robitaille found in N. S. T. A. training "a lifetime of selling experience." "My earnings have jumped to 100% more than I got at the time I began studying your course."

His Own Boss—At Doubled Wages
"I'm my own boss now," proudly writes W. Hayes, an N. S. T. A. graduate. "Since taking this course I have more than doubled my income." In one week recently three other concerns tried to hire him away from his present job.

Here are six men who were formerly caught in the hopeless tread-mill of low-pay jobs. Today every one of them reports earnings from $4,000 up to $10,000 a year! Right now—the same opportunity that changed their lives so completely is open to you! Don't fail to read every word of this vital message!

When a man who has been struggling along in a low-pay job suddenly steps out and starts earning real money—$5,000, $7,500 or $10,000 a year, he usually gives his friends quite a shock. It is hard for them to believe that he is the same man they used to know. Take one of the men whose pictures appear on this page—J. M. Huppert, for example. Huppert was a plumber's apprentice at $23 a week. If he had predicted that he was about to make two years' pay within a period of three months, his friends would have thought he was joking. But he knew what he wanted, and he set about getting it in the shortest possible way. "The Key To Master Salesmanship" opened his eyes to the opportunities in the selling profession. This book proved that Master Salesmen are made, not "born." It told facts and secrets about money-making that were a positive revelation. And best of all, it outlined a simple plan that enables men from all walks of life to quickly reach the top without spending years on the road—without losing a day or a dollar from their present positions!

A Few Weeks—Then Bigger Pay

Huppert seized the opportunity to qualify as a Master Salesman, and has richly profited by it. He now reports an increase of many times his former weekly earnings, and his future possibilities are unlimited. Some of his former friends perhaps say he was "lucky." He was. But his "luck" lay in his decision to cast his lot with the N.S.T.A. Thousands of other men have been similarly "lucky." Some report increases ranging up to 900%. They have forgotten the days when they were caught in the rut—but they never forget that they owe a great part of their success to N.S.T.A. training.

NATIONAL SALESMEN'S TRAINING ASSOCIATION
Dept. B-705, 21 W. Elm St. Chicago, Ill.

Send for These FREE Books!

The Key to MASTER-SALESMANSHIP
Mistakes commonly made in selling

You may have doubts in your own mind about how salesmanship can help you solve your own problem. If so, all the more reason to send for these two books: "The Key To Master Salesmanship" and "Mistakes Commonly Made In Selling." See for yourself what salesmanship has done for thousands already; see how this training has brought sudden success to men who thought they were doomed to failure, after disappointing experiences in sales work. No matter what your experience has been, or what your present thoughts on selling are, send for these two books today and learn these amazing new facts. Mail the coupon now!

National Salesmen's Training Association,
Dept. B-705, 21 W. Elm St., Chicago, Ill.

Without cost or obligation I will accept copies of your books "The Key To Master Salesmanship" and "Mistakes Commonly Made In Selling," with details of your System of Training and Free Employment Service.

Name..

Address..

City.............................State.............

Age...........Occupation........................

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EDITED BY EXPERTS

Listed here are the members of the Modern Mechanix Board of Editors, all qualified by national repute to serve as authorities. They will gladly answer questions from readers if stamped envelope is sent. Address them in care of this magazine, 529 S. 7th St., Minneapolis, Minn.

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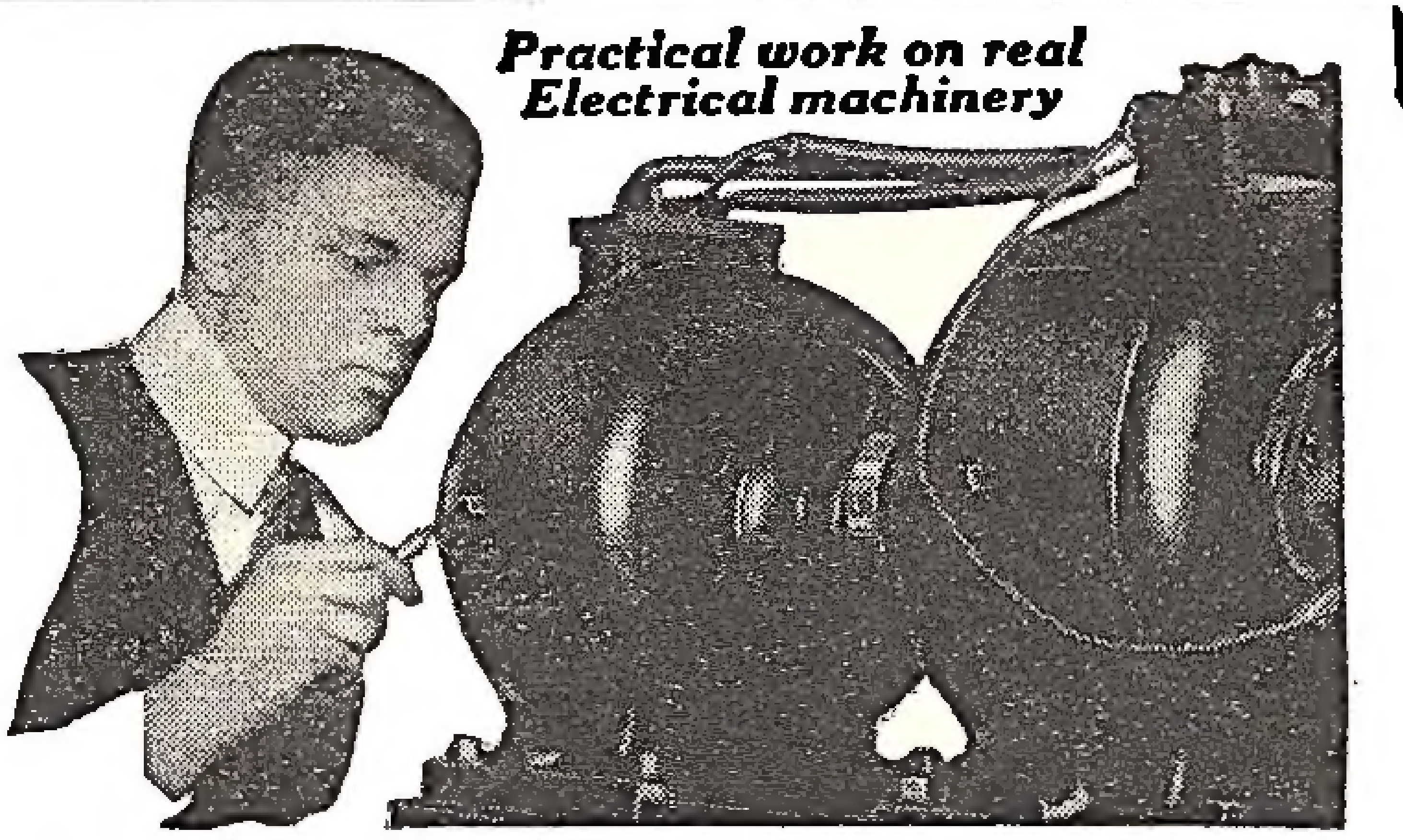
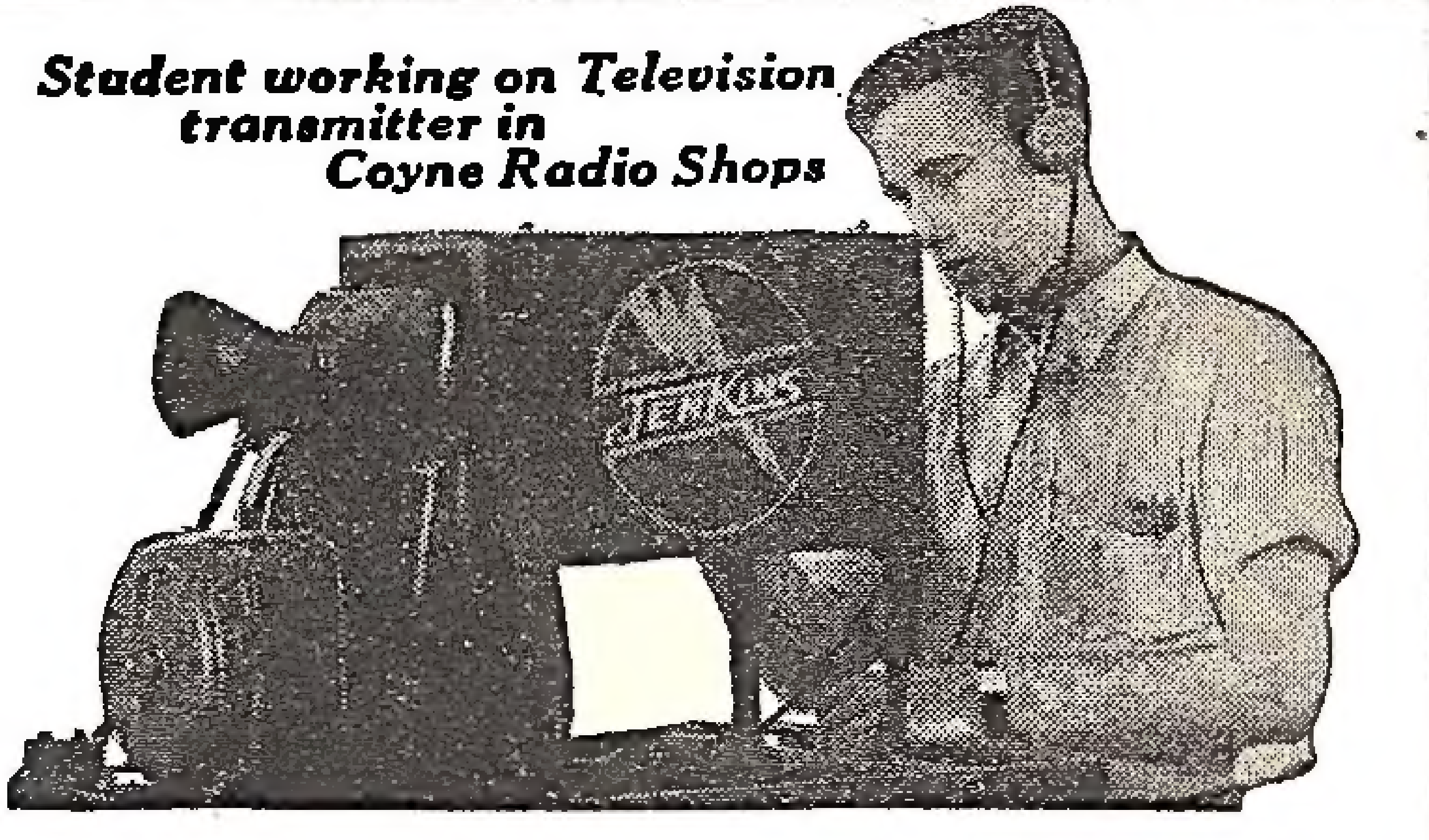
NOW-GET INTO ONE OF THESE BIG PAY FIELDS!

PAY FOR YOUR TRAINING AFTER YOU GRADUATE



Practical work on real Electrical machinery



Student working on Television transmitter in Coyne Radio Shops

Amazingly Easy Way to Get Into ELECTRICITY

Dissatisfied with your job? Not making enough money? Then let me show you an easy way to get into Electricity, where thousands of Trained Men are drawing down Big Pay envelopes every week. Coyne has been training men for the Electrical Industry since 1899. **12 WEEKS' TRAINING HERE IN MY SHOPS WILL GIVE YOU THE START YOU NEED.**

Learn RADIO TELEVISION TALKING PICTURES

Prepare for jobs in Service Work, Broadcasting, Talking Pictures, Wireless Operating, etc. Get in on the ground floor of Television! Radio has grown in a few years from a mere experiment to a **Billion Dollar** industry. There are many opportunities for the trained man. **PREPARE FOR THEM NOW BY 10 WEEKS OF ACTUAL SHOP WORK AT COYNE!**

WHY I CAN DARE TO MAKE THIS SENSATIONAL OFFER!

You can now take Coyne Training without paying for your training until **2 full months** after graduation, and then **I give you 10 months** to complete your payments! That's my LATEST, GREATEST OFFER! I can dare to do this because the type of man who really wants to get ahead, is honest. If you're ambitious enough to send in the coupon below, I know you'll make good!

Practical Work in COYNE SHOPS

It's EASY to learn a BIG-PAY TRADE with my "Learn-by-Doing" method. Not by books, not by correspondence, but by ACTUAL PRACTICAL WORK JUST LIKE YOU WOULD DO ON THE JOB. That's why many concerns endorse Coyne and prefer Coyne Trained Men.

Many Earn While Learning

If you're short of funds, don't let that stop you. Many students earn all or a large part of their living expenses doing part-time work while here. We'll help you—and then help you get located when you graduate. Coyne Employment Service produces amazing results. You receive this service absolutely FREE as my student.

REAL JOBS—GOOD MONEY—QUICK!

"Coyne boosted my pay from $20 to $50 a week," writes D. Ellsworth, North Carolina. "Got this fine job on shipboard, thanks to Coyne Training, and now make $350 a month," says G. P. Vautrot, California. Hundreds of successful men boost Coyne. What they have done, you too should do!

Get Pay-Raising Facts FREE!

Select the field you like best, then mail one of the coupons below. Let me send you either my BIG FREE ELECTRICAL BOOK or MY BIG FREE RADIO-TELEVISION BOOK. No cost or obligation. Do it today!

MAIL ONLY THIS COUPON FOR FREE ELECTRICAL BOOK

H. C. LEWIS, President
COYNE ELECTRICAL SCHOOL, Dept. 23-53
500 S. Paulina Street, Chicago, Illinois

Gentlemen: Please send me your big Free Electrical Book, with 151 illustrations and details of your "Pay After Graduation" offer. This does not obligate me in any way.

Name...

Address...

City.................................*State*.................................

MAIL ONLY THIS COUPON FOR FREE RADIO BOOK

H. C. LEWIS, President
RADIO DIVISION, COYNE ELECTRICAL SCHOOL
500 S. Paulina St., Dept. 23-1H, Chicago, Ill.

Gentlemen: Send me your Big Free Radio, Television and Talking Picture Book and details of your "Pay After Graduation" offer. This does not obligate me in any way.

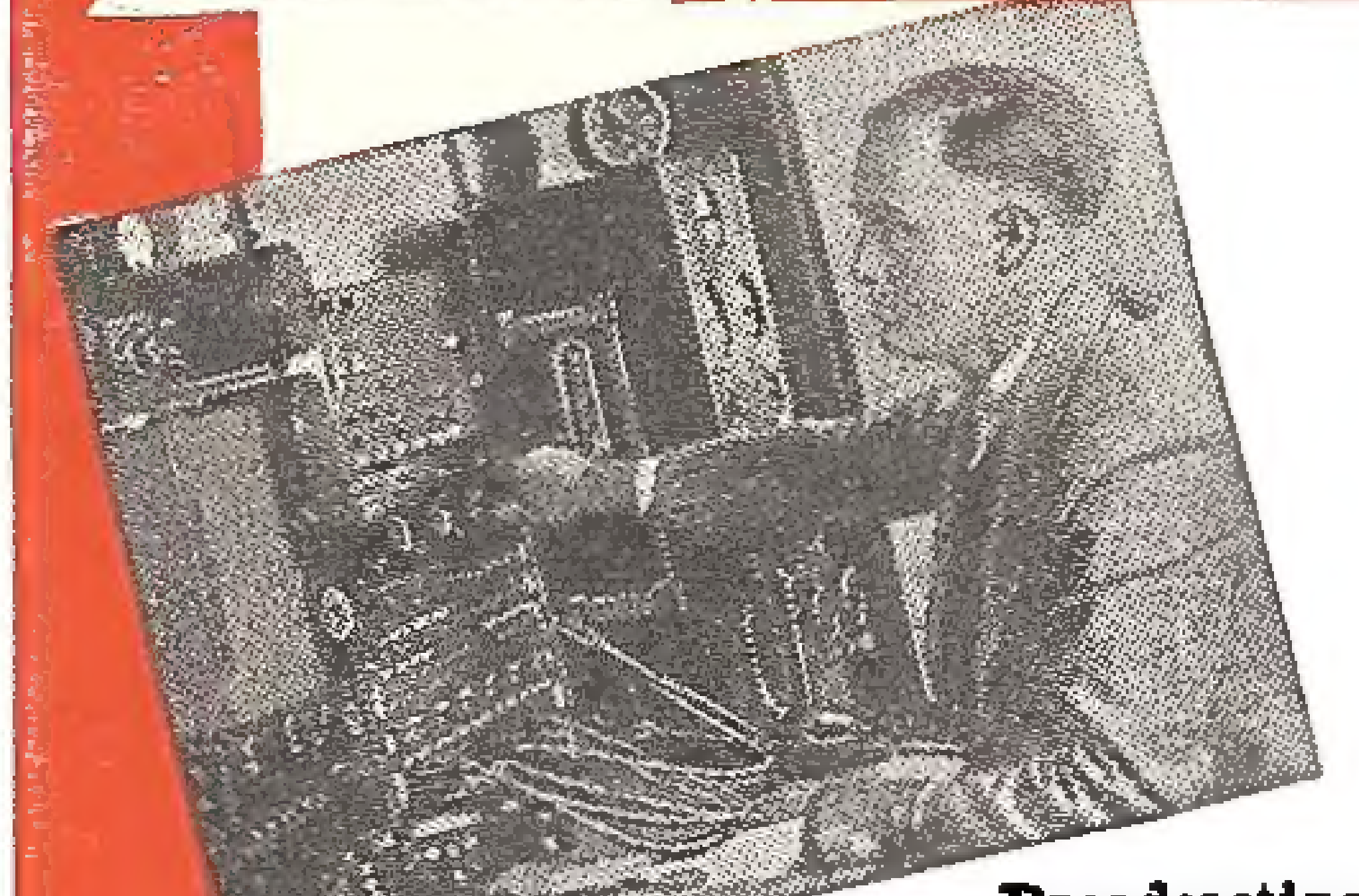
Name...

Address...

City.................................*State*.................................

More Money

I show beginners how -- experienced service men



Broadcasting Stations employ trained men for jobs paying up to $5,000 a year.

My book, "Rich Rewards in Radio," gives you information on the opportunities in Radio and explains how I train you quickly to become a Radio Expert through my practical Home Study training. It is free. Clip and mail the coupon NOW. Radio's amazing growth has made hundreds of fine jobs which pay $50, $60, $75, and $100 a week. Many of these jobs may quickly lead to salaries as high as $125, $150, and $200 a week.

Radio—the field with a future

Ever so often a new business is started. You have seen how the men who got into the automobile, motion picture, and other industries when they were started had the first chance at big jobs—the $5,000, $10,000, and $15,000 a year jobs. Radio offers the same chance that made men rich in those businesses. It has already made many independent—will make many more wealthy in the future. You will be kicking yourself if you pass up this once-in-a-lifetime opportunity.

Television—the coming field of many great opportunities —is covered by my course.

Many Radio Experts make $50 to $100 a week

In a few years 300,000 jobs have been made by Radio's growth. Thousands more will be made by its future development. Men with the right training —the kind of training I will give you in the N.R.I. Course—have stepped into Radio at 2 and 3 times their former salaries. Experienced service men as well as beginners praise N.R.I. training for what it has done for them.

Spare Time set servicing pays many N. R. I. men $200 to $1,000 a year. Full time men make as much as $50, $65, and $75 a week.

Many make $5, $10, $15, a week extra in spare time almost at once

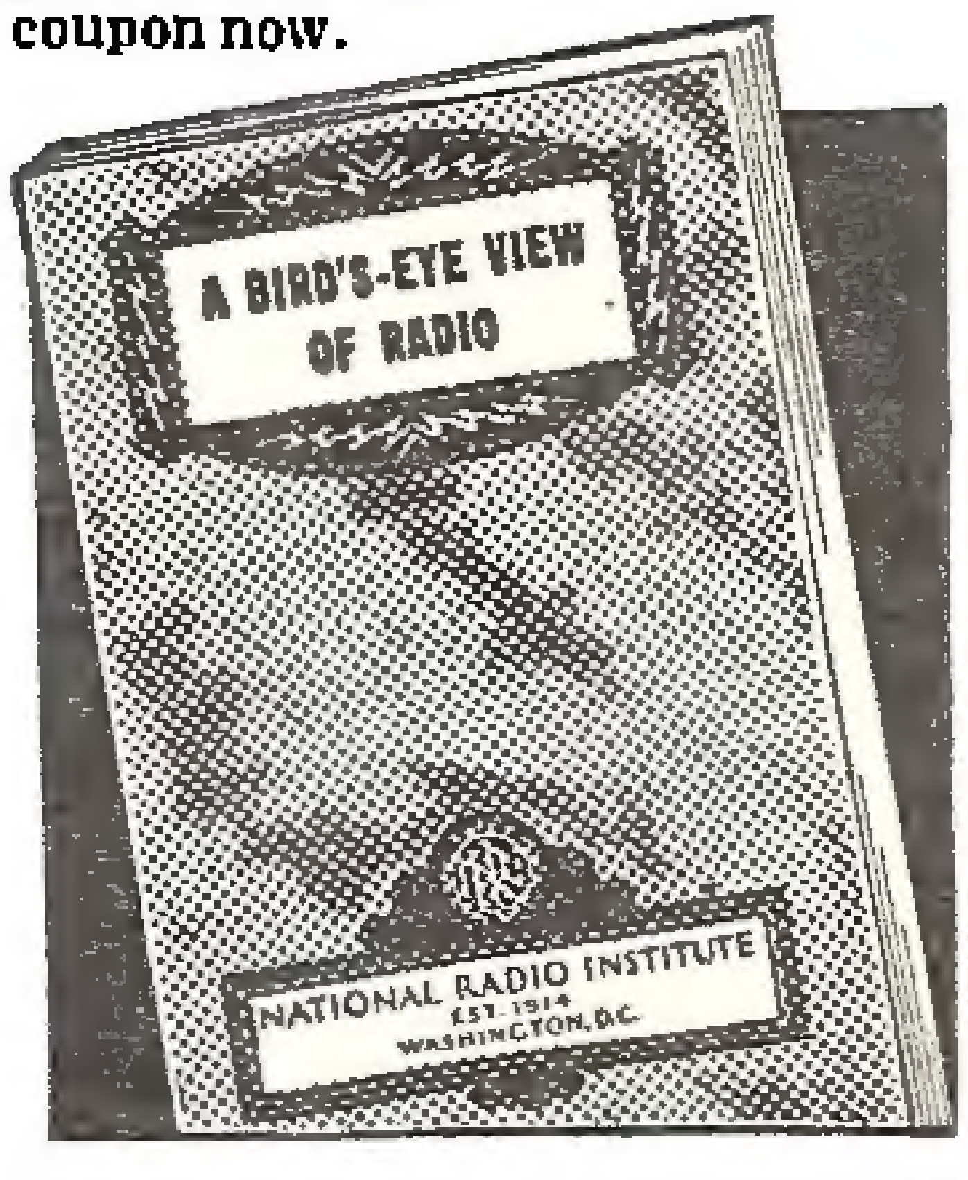
My Course is world-famous as the one "that pays for itself." The day you enroll I send you material, which you should master quickly, for doing 28 Radio jobs common in most every neighborhood. Throughout your Course I will show you how to do other repair and service jobs on the side for extra money. I will not only show you how to do the jobs, but how to get them. I'll give you the plans and ideas that have made $200 to $1,000 a year for N.R.I. men's spare time. G. W. Page, 110 Raleigh Apts., Nashville, Tenn., writes: "I made $935 in my spare time while taking your Course."

Talking Movies—an invention made possible by Radio—employs many well trained Radio men for jobs paying as much as $75 to $200 a week.

Police Departments are finding Radio a great aid in their work. Many good jobs have been made in this new field.

Sample Lesson FREE

I'll send you a Free Lesson to prove that my Radio Course is easy, practical. That's how confident I am that I can train YOU at home in your spare time to become a Radio expert. Only my students could have this book in the past. I KNOW that when you see it, read it, examine it, you will be delighted with its clear, simple way of teaching Radio. I KNOW—because I have ALREADY trained thousands of men. Many of them with not even a grammar school education, and no Radio or electrical experience, have become Radio experts and earn two or three times their former pay. Mail the coupon now.



Some of the Jobs N. R. I. Trains Men For

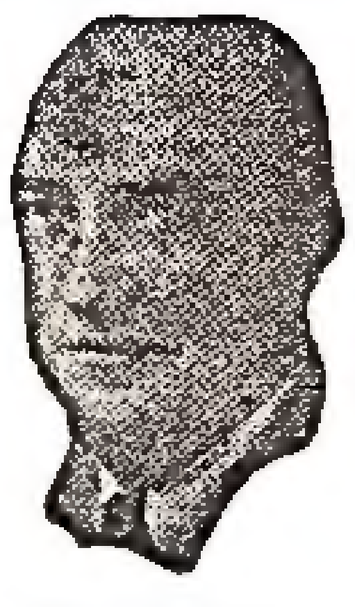
- Broadcast Engineer
- Maintenance Man in Broadcasting Station
- Installation Engineer of Broadcast Apparatus
- Operator in Broadcast Station
- Aircraft Radio Operator
- Operator of Airway Beacons
- Service Man on Sound Picture Apparatus
- Operator of Sound Picture Apparatus
- Ship Operator
- Service Man on Public Address Systems
- Installation Engineer on Public Address Systems
- Sales Manager for Retail Stores
- Service Manager for Retail Stores
- Auto Radio Installation and Service Man
- Television Broadcast Operator
- Set Servicing Expert

Act! MAIL COUPON Today - - - Get The Facts About

for You in Radio

to get into Radio quickly how to get better jobs-better pay

Here's Proof



$400 Each Month

"I spent fifteen years as traveling salesman but could see the opportunities in Radio. I have made more money than ever before. I have made more than $400 each month and it really was your course that brought me to this." J. G. Dahlstead, Radio Station KYA, San Francisco, Cal.

Radio Service Man Doubles Salary

"I spent 15 years building and repairing Radios, but felt I could refresh my memory. Upon completion, I was appointed Service Manager of Parks & Hull, I give N. R. I. full credit for my success---it immediately increased my earnings 100 per cent." J. E. McLaurine, 1511 Guilford Ave., Baltimore, Md.

From $10 to $50 a week in spare time

"Besides being employed by the Power & Light Company to locate Radio interference, I have a service business of my own that nets me from $10 to $50 a week in spare time. I owe all my success to the National Radio Institute, as I was only a common factoryworker." H. L. Penie, 812 W. High Street, Piqua, Ohio.

Get ready for jobs like these

Broadcasting stations use engineers, operators, station managers and pay up to $5,000 a year. Radio manufacturers employ testers, inspectors, foremen, engineers, service men, buyers, and managers for jobs paying up to $6,000 a year. Radio dealers, jobbers (there are over 35,000) employ service men, salesmen, buyers, managers and pay up to $100 a week. Talking pictures pay as much as $75 to $200 a week to men with Radio training. There are hundreds of opportunities to have a spare time or full time Radio business of your own. I'll show you how to start your own business on money made in spare time while learning. My book tells you of other opportunities.

You can learn at home in your spare time to be a Radio Expert

Hold your job. There is no need for you to leave home. I will train you quickly and inexpensively during your spare time. You don't have to be a high school or college graduate. My Course is written in a clear, interesting style that almost anyone can grasp. I give you practical experience under my 50-50 method of training—one-half from lesson books and one-half from practical experiments with equipment given without extra charge. It makes learning at home easy, fascinating, practical.

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J. E. SMITH, President
Dept. 3BH, National Radio Institute
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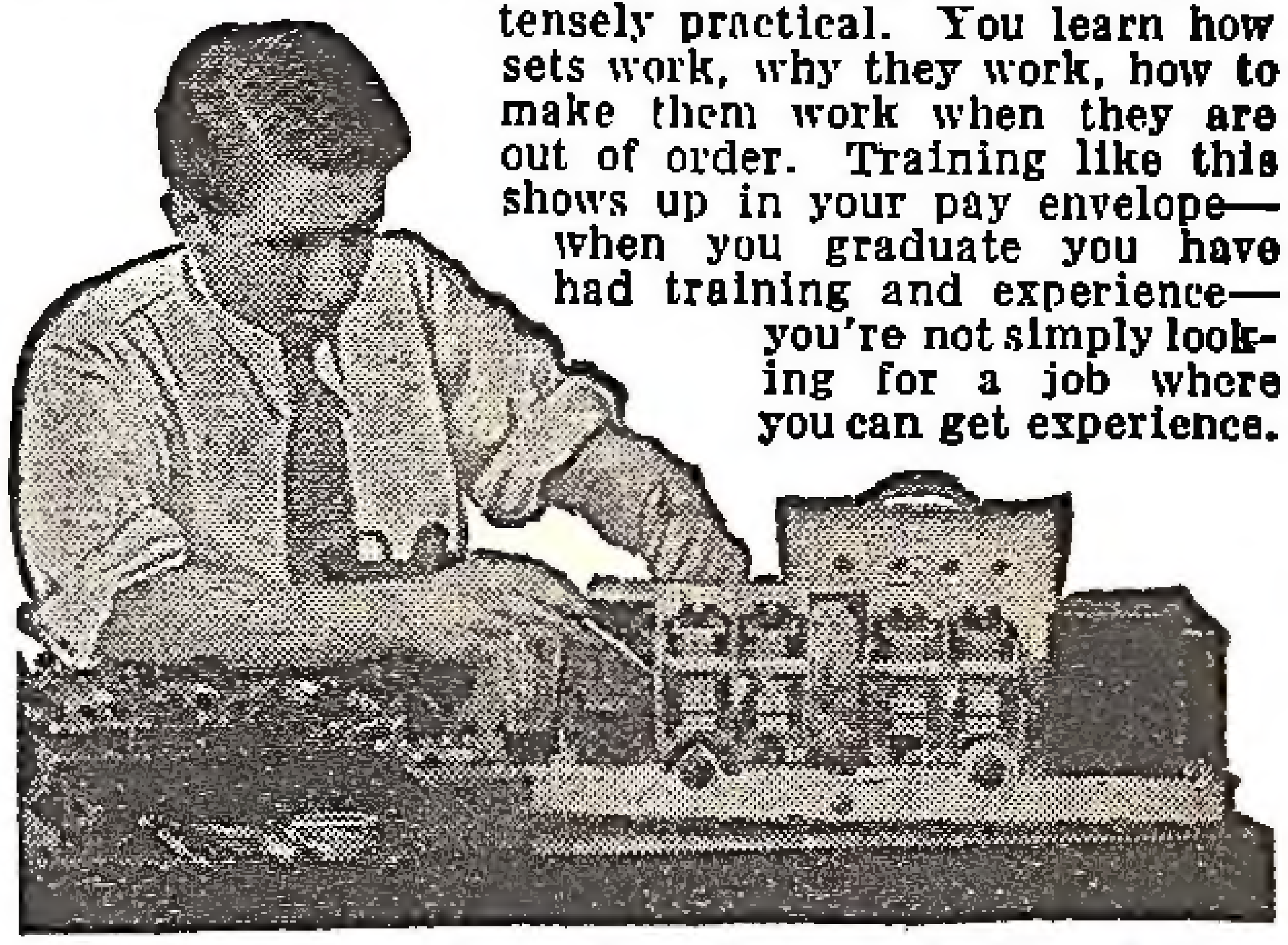

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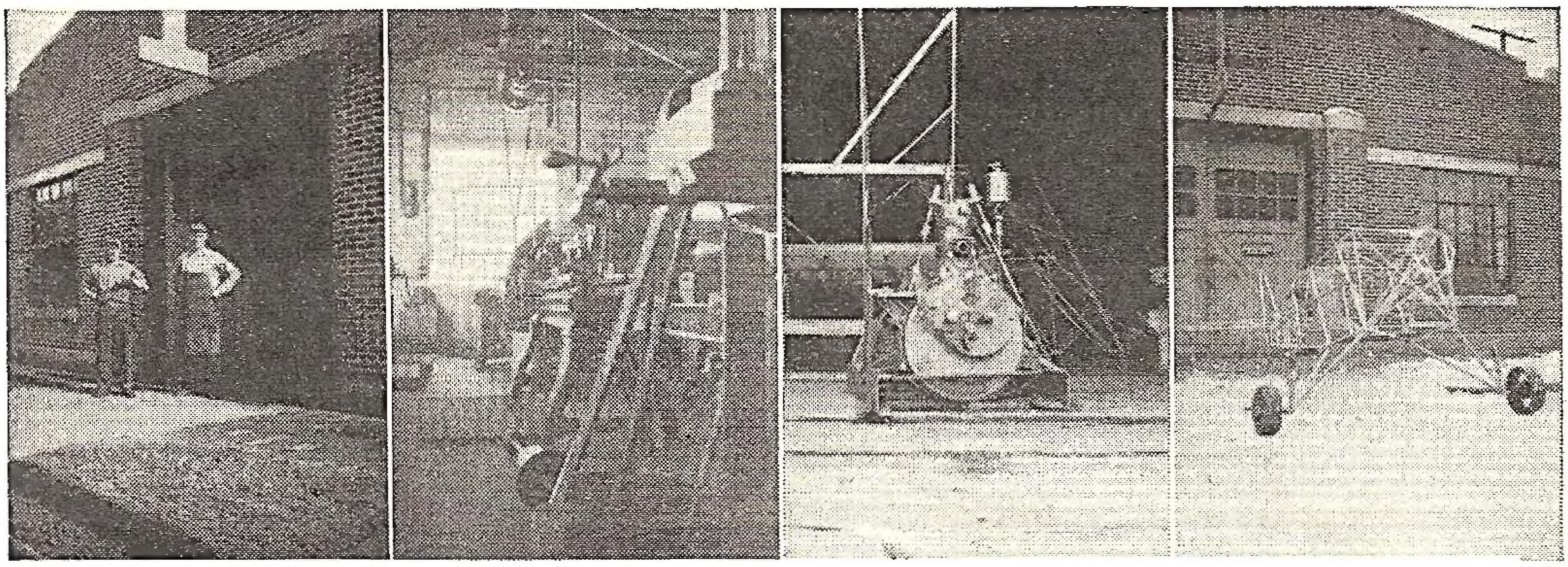
The Famous Course That Pays For Itself



Here is the operating locale of Byron Cudd, Menomonie, Wis., reader of Modern Mechanix. Left, the garage, next the machine shop, then the Diesel engine Cudd has built (see text) and right, the fuselage of his experimental airplane.

Andy's Shop Mail Box

Andy comes through this month with less talk and more action in letting readers hold sway in the "colyum" he has made famous. They do a better job than he can, says the Grizmonk.

ONE of the most misguided projects my dearly beloved readers continually ask advice on is the construction of airplane type catamaran speed boats, or whatever you call 'em. You know—pontoons with an airplane fuselage, and a prop up front all same airplane.

A lot of the boys write me about how to build one and why don't we run plans, etc. The answer is, I will when I see one that will work.

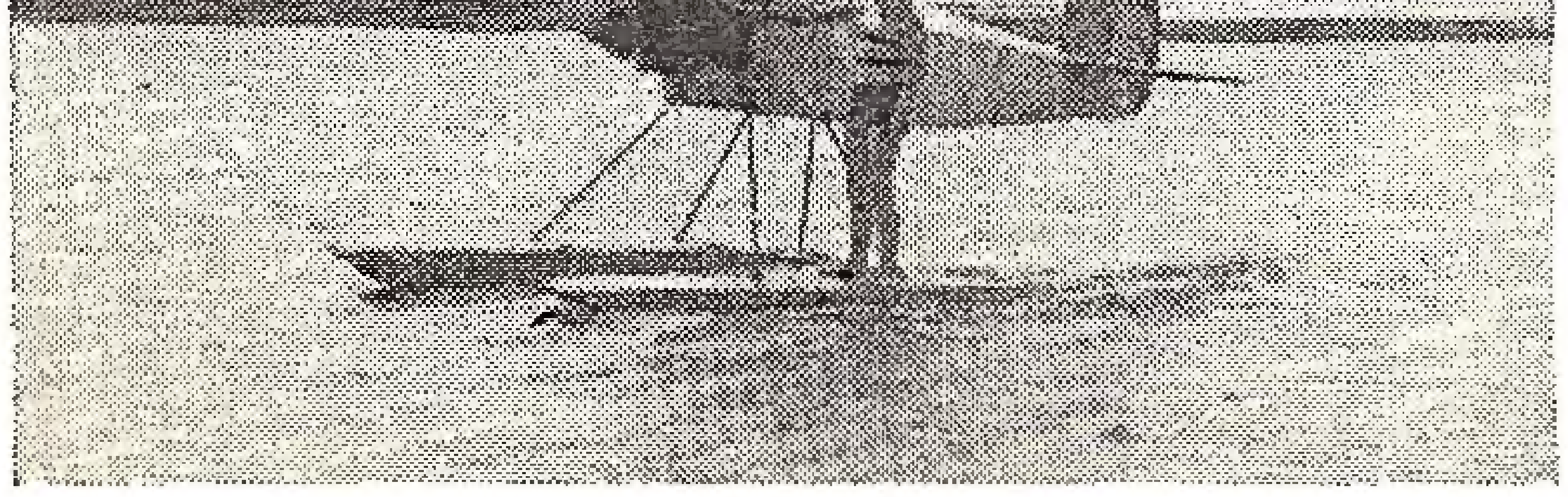
Some day no doubt some smart cookie will design one of these things that will really go. But it will have to have a lot of power, be light, and be devoid of the cussedness now exhibited by every member of the breed.

Read this letter; glimpse this photo; then hear what Andy the Grizmonk has to say.

Minneapolis, Minn.

Dear Andy:

I am enclosing a snap of a rig built by a partner, Mr. Carl Lostrom, and myself of Parkville, Minn. It is powered by a Model T Ford converted engine and sits on floats 11½ feet long and 18 inches wide. The floats were made of a framework of white pine which was covered with masonite prestwood which is much cheaper than plywood and serves the purpose very well. We found a water rudder necessary because when the lake was a little rough she would head into the wind and stay there. We made the floats seaplane style with the step slanting upward. This was a very bad mistake because the bottom surface to plane on was so lowered that we could not get it up on the step. It just plowed through the water at about 20 miles per hour. We hope to eliminate the step so as to get some surface to plane on.



Here's Richard Erickson's straddle bug, the trials of which are told in the letter in the column.

We spoiled one prop by going out when the lake was very rough. The water splashed up into the prop and in about 10 minutes the tips were so badly worn it was out of balance. We didn't notice it until the motor began to vibrate. The rig cost about $80. I would like to hear from anybody who has had experience with a rig like ours and will give anybody info on a rig like this.

Yours,

RICHARD ERICKSON.

P.S. I think your magazine is perfect. I suppose this letter is too long to print but I would appreciate your passing the info along that I would like to hear from any fellow on the subject of air driven rigs.

There you are.

The troubles Dick Erickson found in his water straddler are common to the breed.

Note he says he had to put a water rudder on her. Note he had trouble with the prop. Note he got 20 miles an hour (maybe) and that the ship wouldn't plane.

Well, let me tell you.

The chief reason these straddlers are not yet

(Continued on page 16)

Promoted— when others were fired!

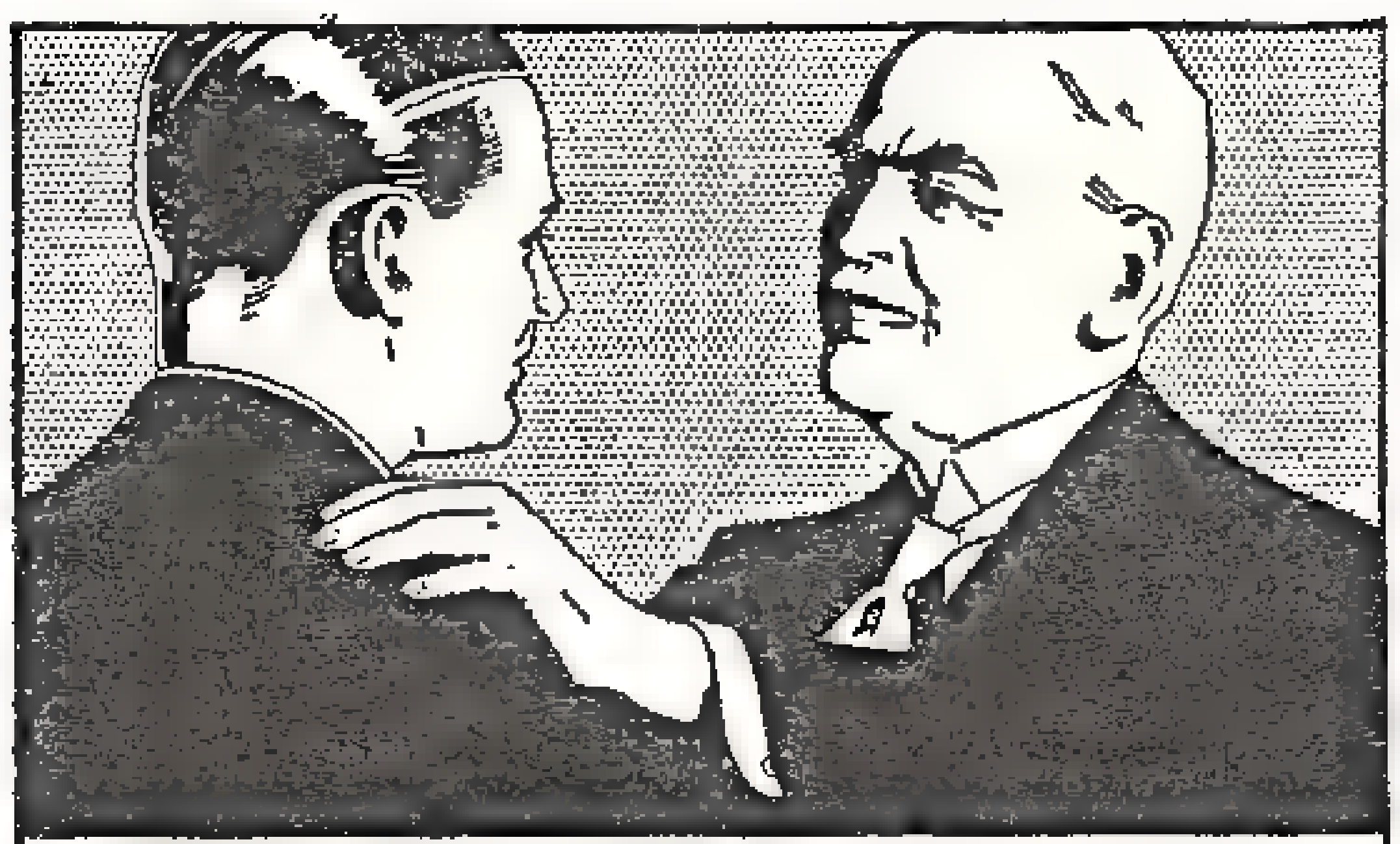
The Story of LaSalle Student Shaw

"Since the War I have been bookkeeper at $35 a week. Married, with one baby girl, I found it harder every month to make ends meet. I was desperate!

"Last winter my wife brought me a LaSalle ad on Higher Accounting—showing how I could study in spare time for the job ahead. I investigated, and enrolled January 23. Just in time! For—

2 WEEKS LATER

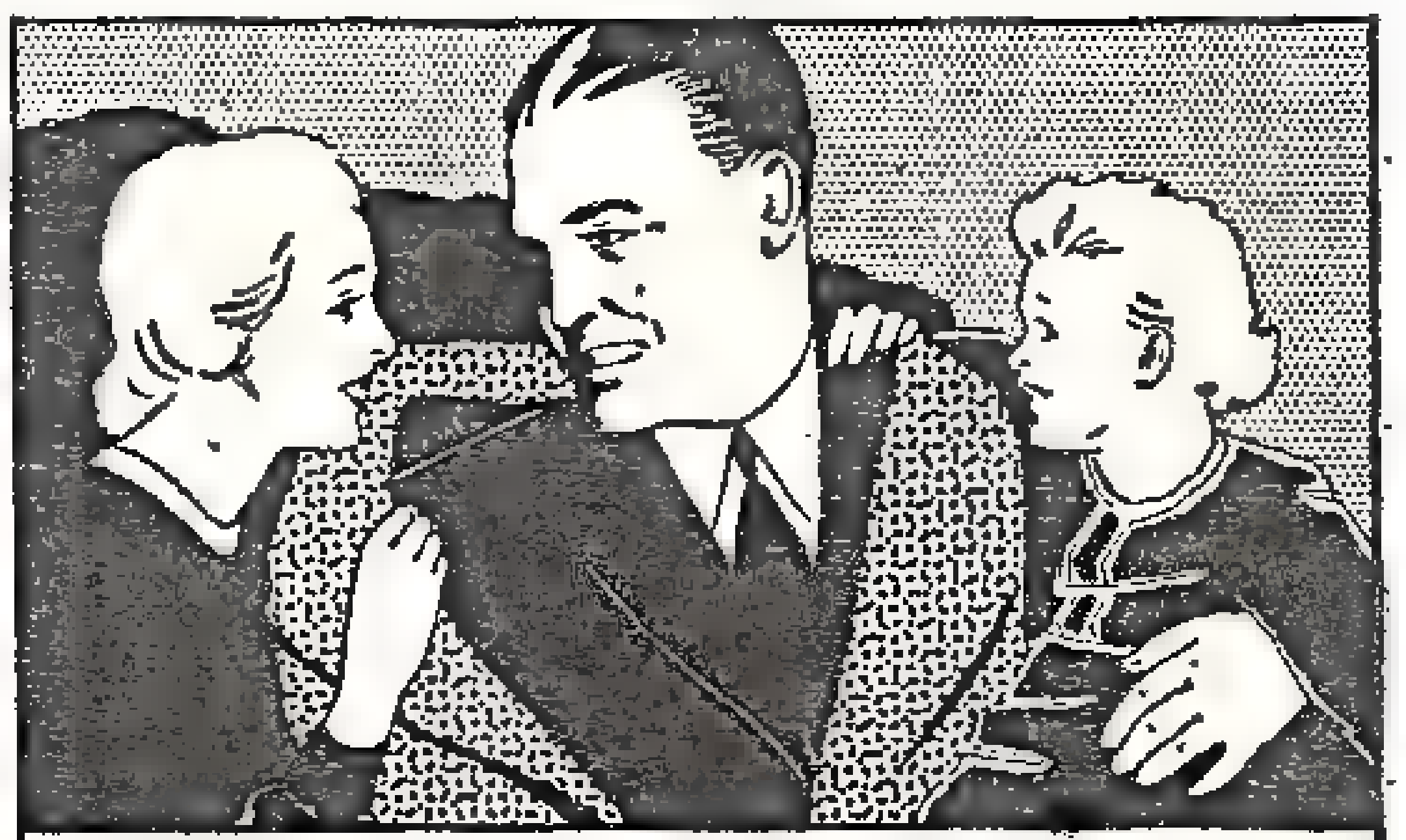
"Suddenly, orders came through to cut the force. I watched seven men in my department get the bad news and leave. Then the office boy tapped me, said I was 'next.' My heart sank as I followed him to the Front Office.



"Smiling, the boss handed me a letter. It was from LaSalle to him, announcing my enrollment and my good work on the first lesson. 'We are keeping you,' he said, 'because we like your spirit.'

6 MONTHS LATER
MR. SHAW

"Naturally, I had more work to do, with the smaller force, but my training made it easier. I learned quickly, and when the Department Manager left, the boss moved me up.



"I have since been promoted twice, and now carry the title of Chief Accountant—at a salary several times greater. The future looks bright. If it had not been for LaSalle, I would be looking for a job right now."

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PATEN

..and TRADEMARKS

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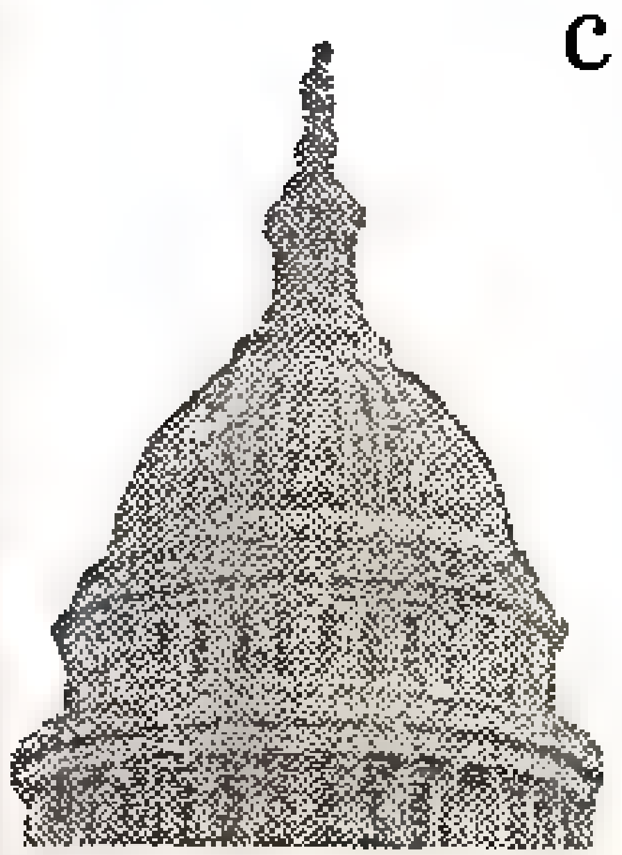
Anything you write me or send me is strictly confidential between us. All letters and drawings are kept in strong, steel, fireproof files, which are open only to myself or authorized members of my staff. I have secured patents for inventors located in every state in the Union. My organization is a large and efficient one. My practice is confined entirely to Patents, Trademarks and Copyrights. I have had years of experience in Patent Matters. When you place your ideas in my hands, I am in position to proceed at once to secure protection for you. My fees are reasonable, and if you desire, I can arrange convenient terms of payment.

My Location in Washington

My offices in Washington are convenient to the Patent Office, and I and my assistants can, therefore, appear promptly before the officials and Examiners.



- Above is a view of my drafting and specification rooms where a large staff of experts is in my constant employ.
- The photo at the right shows a section of my large filing department. All disclosures from clients are held in the strictest confidence in strong, steel files.

INVENTORS

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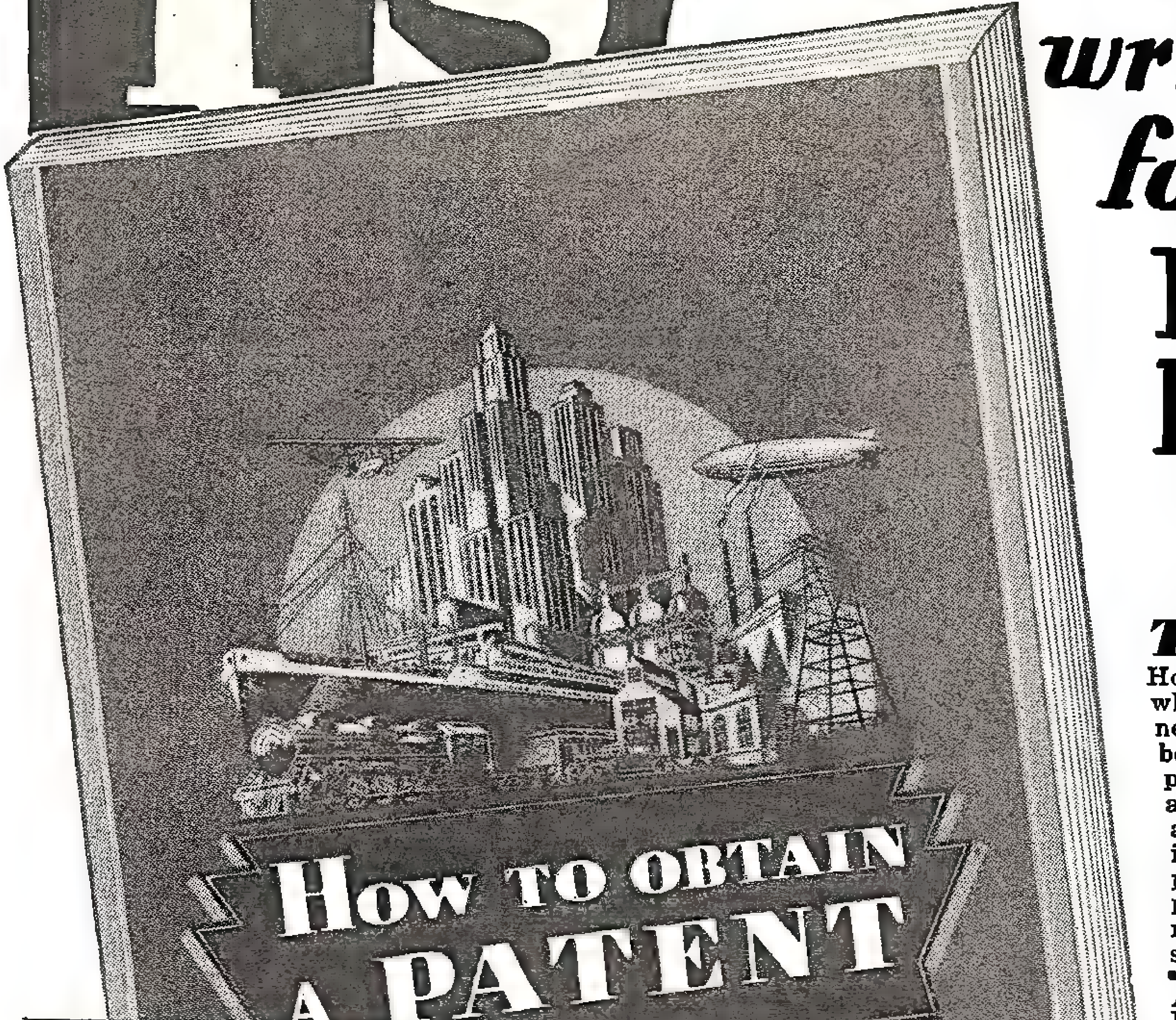

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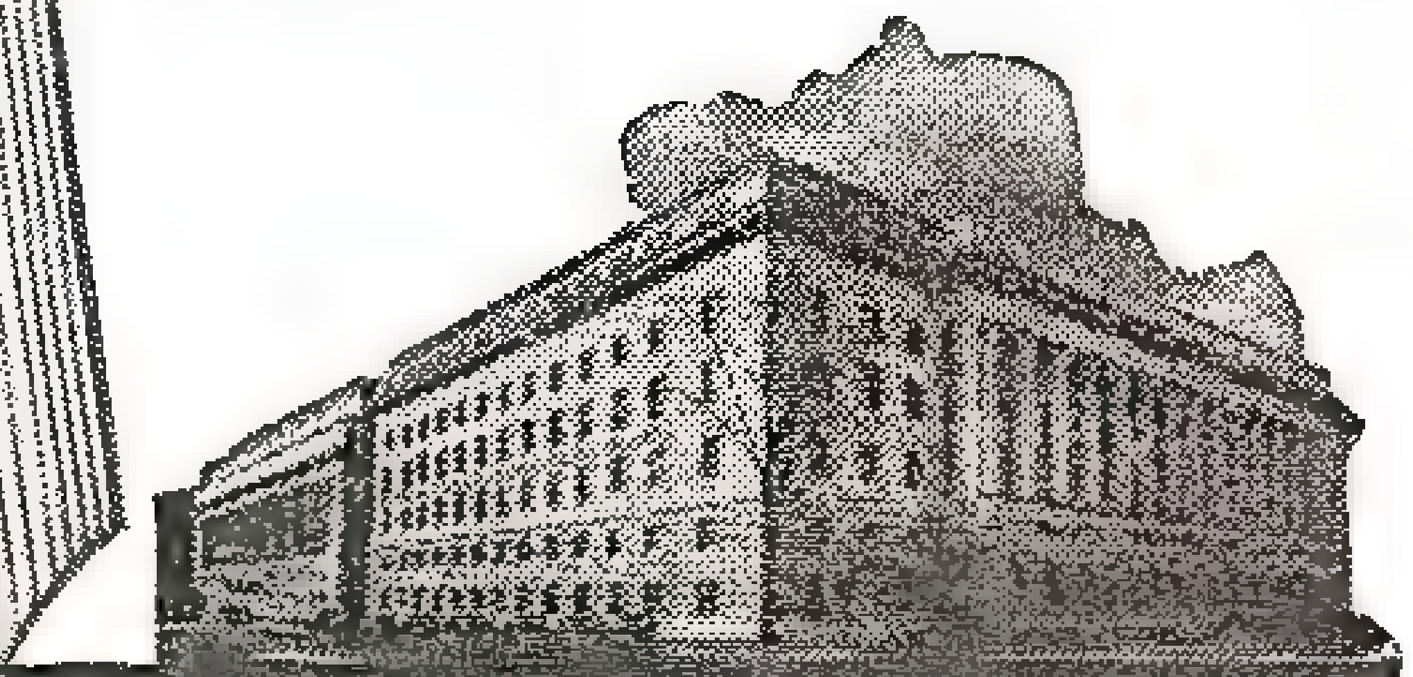
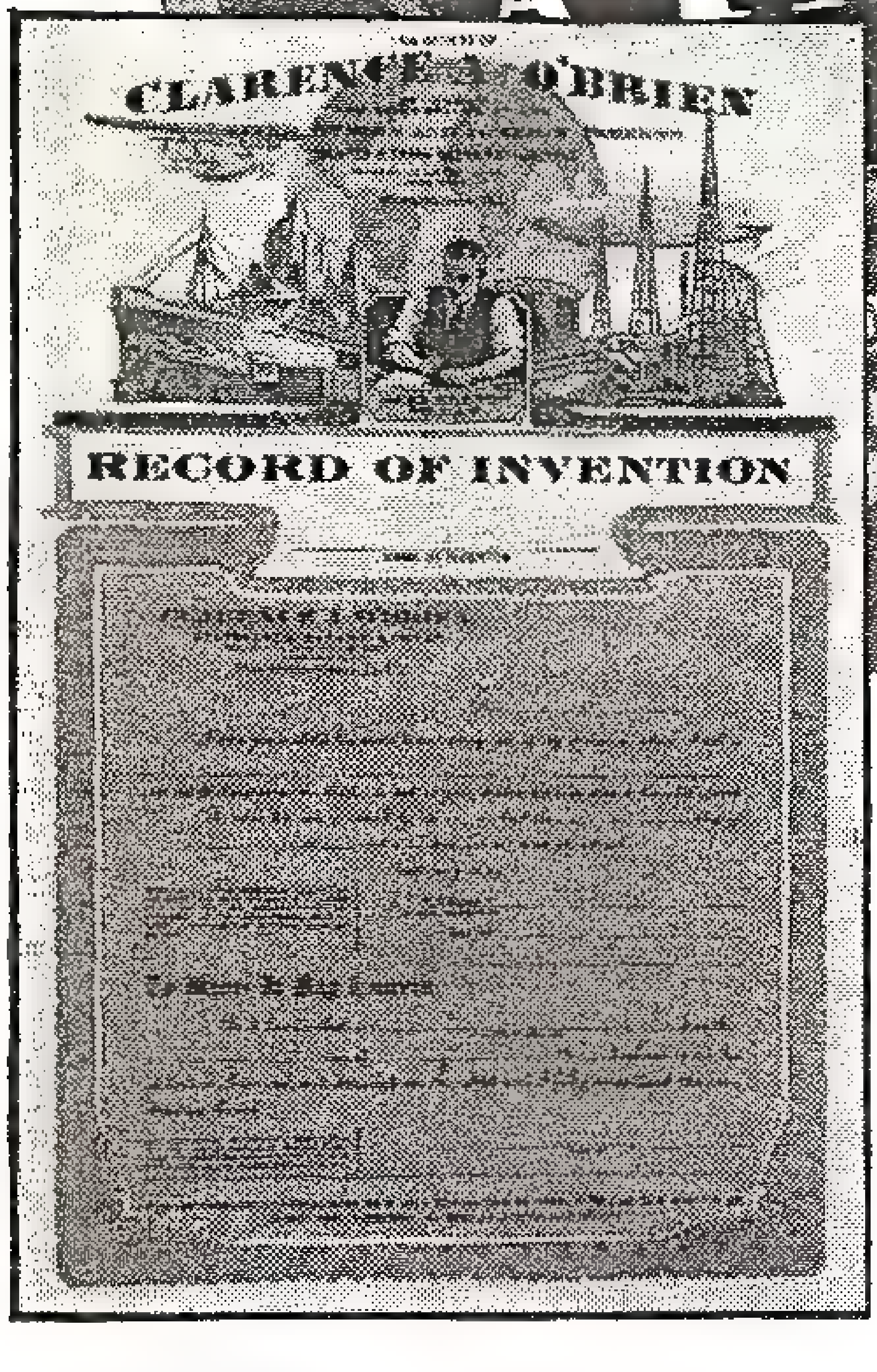
How your Patent Application is made; what kind of sketches or drawings are necessary; what other papers must be made out; how the Patent Laws protect you; why it is important to avoid loss of time in getting your application filed; and many other important points. Even a very simple idea, if new and useful, may prove very valuable. You may have much to gain and nothing to lose by sending for this book TODAY.



A view of the new Dep't of Commerce Building where the U. S. Patent Office is now located.



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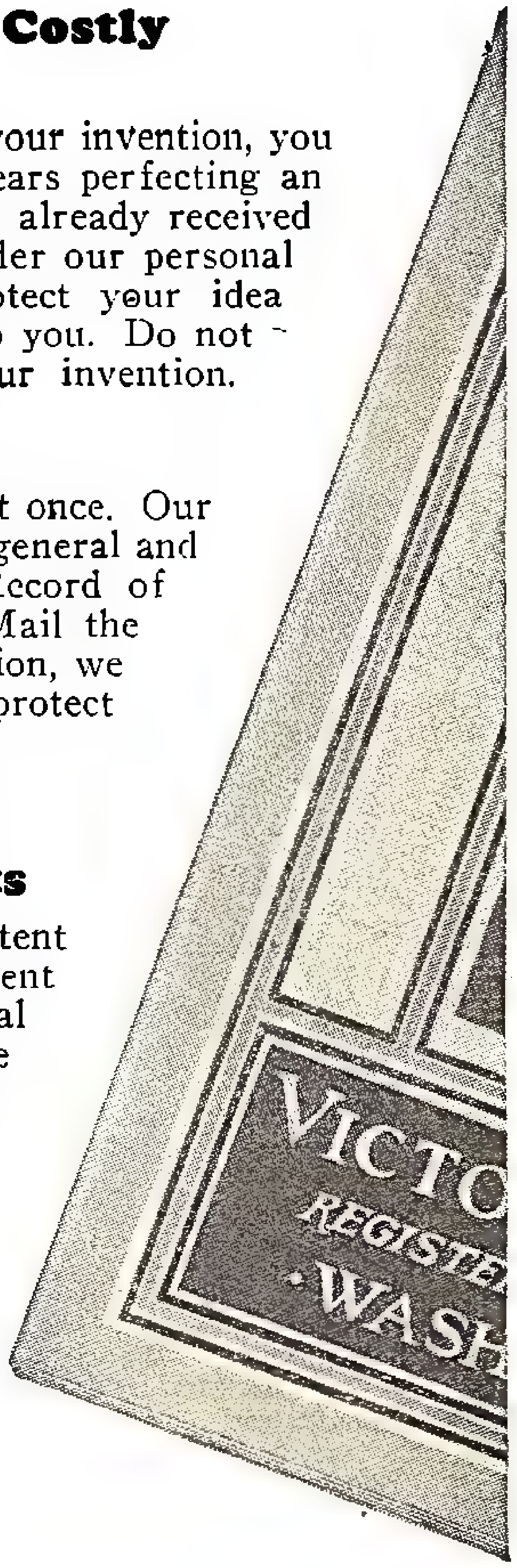

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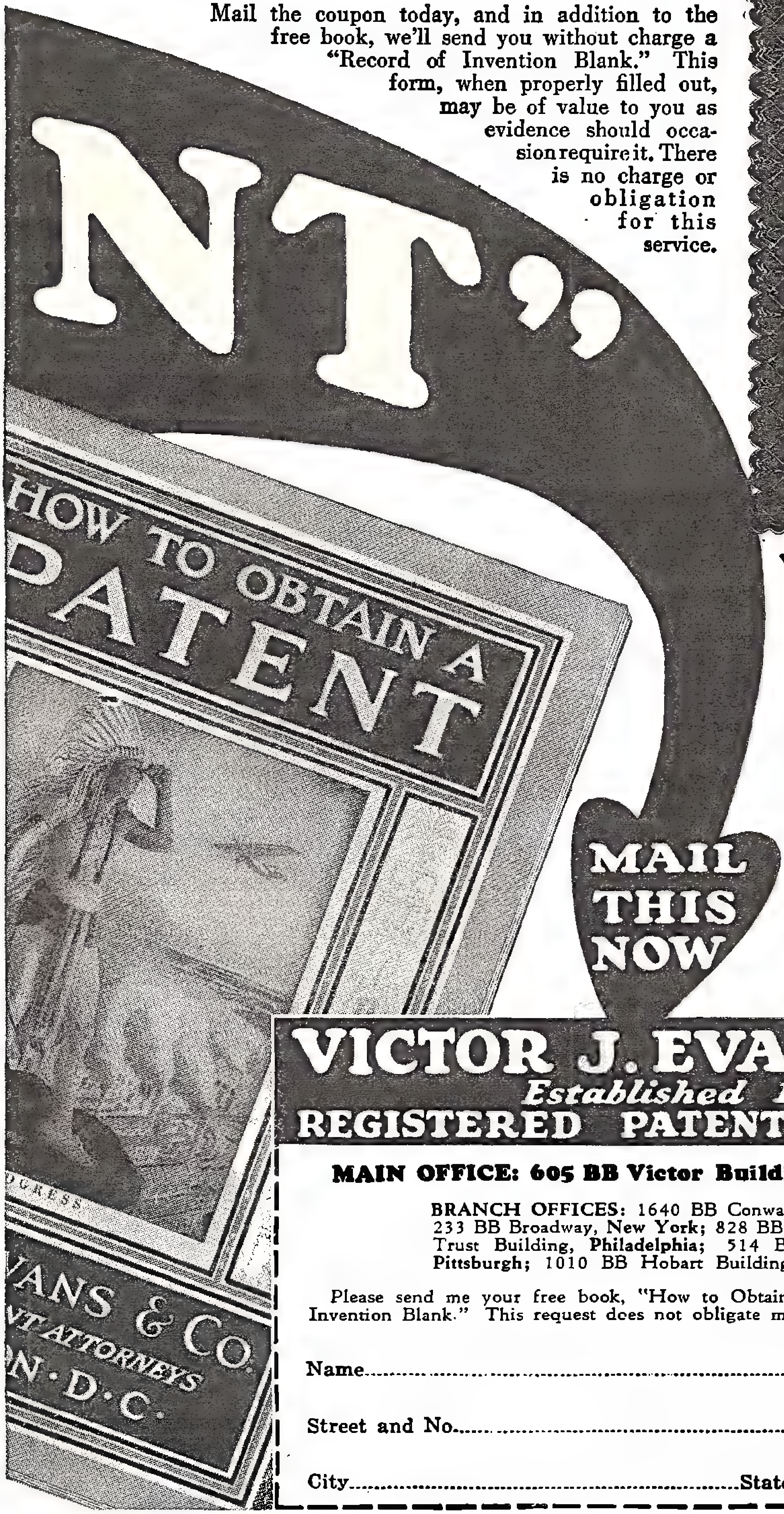

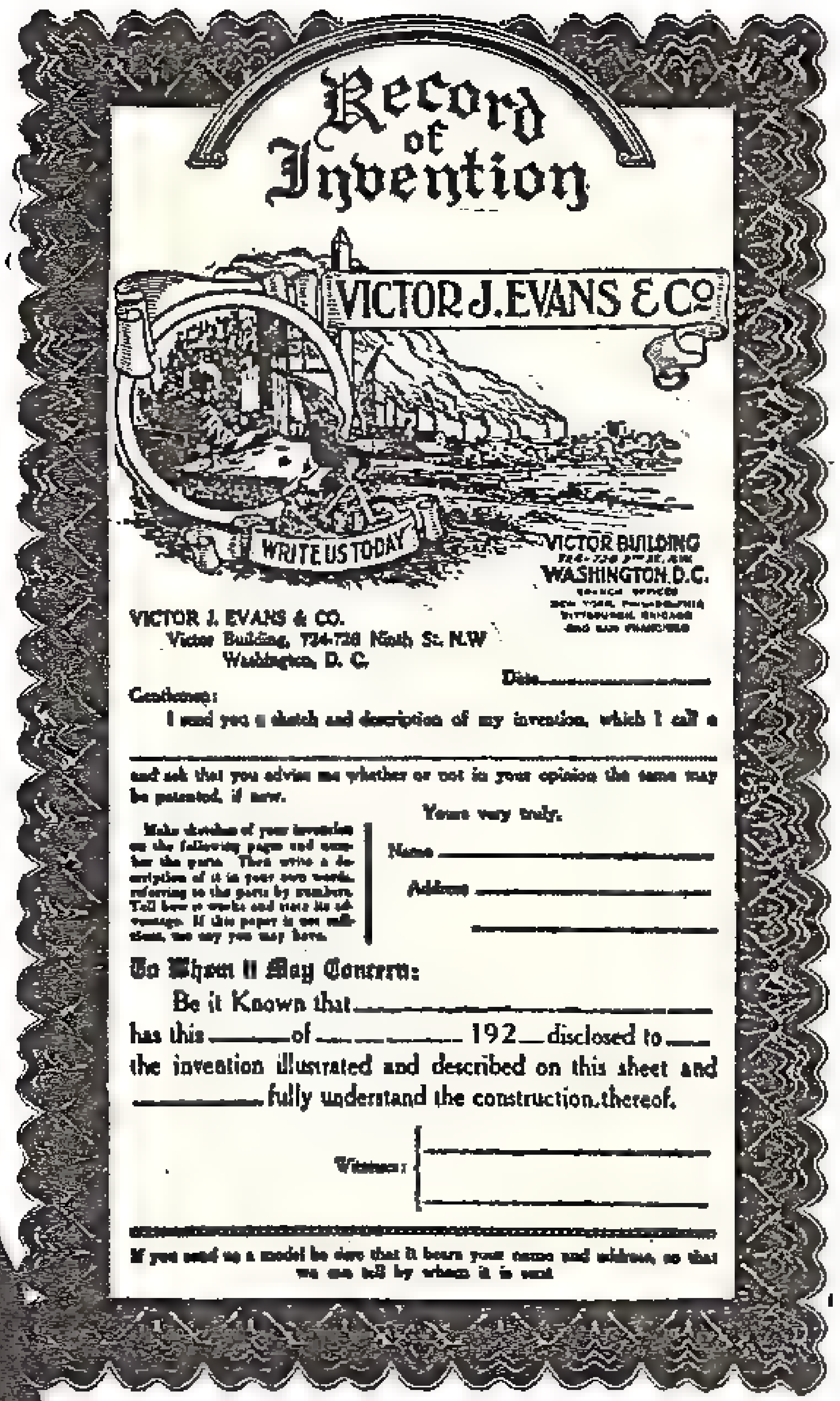

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Yours very truly,

Name

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Make sketches of your invention on the following pages and number the parts. Then write a description of it in your own words, referring to the parts by numbers. Tell how it works and state its advantage. If this paper is not sufficient, use any you may have.

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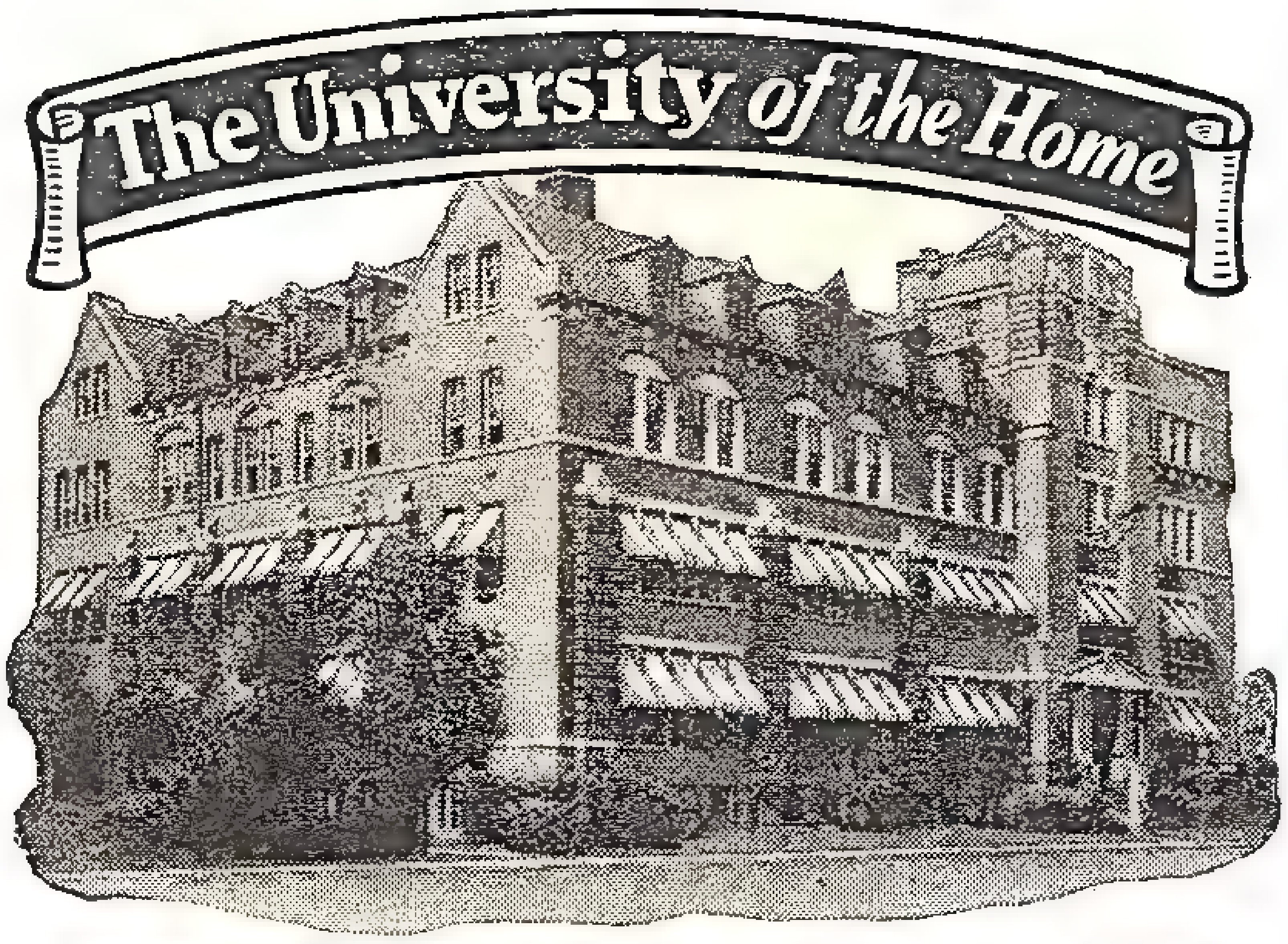

It's Cheaper to Get Specialized Training Than to Get Along Without It

U. S. Government statistics show that a man who has obtained specialized training in College or Engineering School *earns $1,313 a year more* than a High School graduate—or a total of $52,520 more during his working life of 40 years.

If you can't go to college, you must nevertheless get specialized training in order to compete for the better-paid jobs. So it's far cheaper to invest a small amount of time and money in a home-study course that will give you the necessary training, than to make no effort at self-improvement and be forced to take a job paying $1,313 less per year.

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☐ Business ☐ Drafting ☐ Elec. Eng.

Name ....Age........

Address..

ANDY'S SHOP MAIL BOX

(Continued from page 10)

successful is a fundamental naval architectural reason: there is so much interference between floats that they cannot act efficiently as hydroplanes. Airplane designers know this. But they put wings on airplanes to make 'em fly, and part of the reason the float system "gets by" on an airplane is because there are wings to help lift them out of the water. Forgetting other considerations, an airplane designer would sooner put a single float on a ship than the double arrangement. More efficient both on water and in the air. But harder to handle.

Next: With the wings left off, the ship must be even lighter to enable it to plane, as all the weight must be supported by floats.

Next: Water rudders have to be added. See what I've told you before? Cross winds, or any kind of a tail wind make these crates unmanageable.

On top of that most of them are powered with motors unfit even for pushing an old auto around. What could be expected out of a heavy, irrationally designed, underpowered straddler than failure?

To me the answer remains just—nuts.

Here's some interesting dope on a glider:

* * *

Vernon, B. C., Canada.

529 So. 7th St.,
Minneapolis, Minn.

Dear Andy:

Enclosed are some snapshots of our Northrop Glider built from the plans taken from your 1930 "Flying Manual."

It was built by Jim Duddle and myself 18 and 17 years old respectively. It took 6 months to complete and its performance was far above our expectations and to date it has had over 2,500 flights without a crack-up of any kind. We usually use 600 feet of ⅜ in. rope, but for the best flights we use 1,300 feet and reach an altitude of around 600 feet. We do considerable gliding at night in the moonlight.

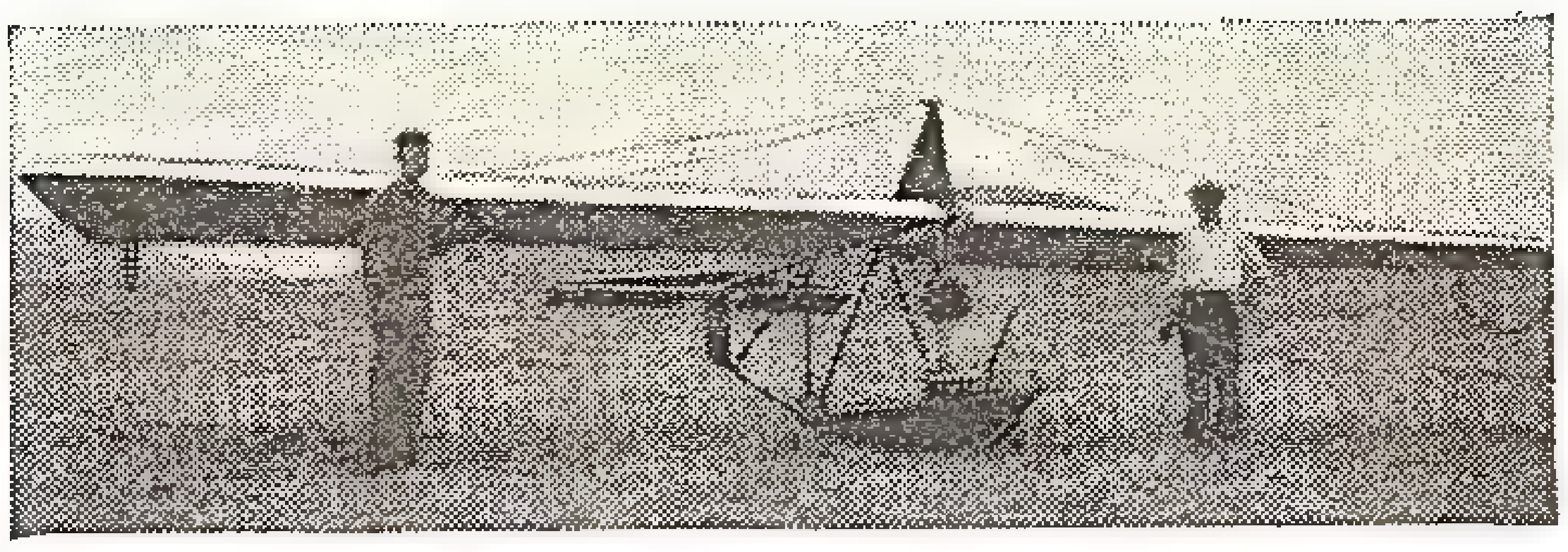
We made a few minor changes, one being substituting compression struts instead of compression ribs. We also substituted nose, or false ribs, for a plywood leading edge.

M. M. and Pack Mag are two great magazines and I always look forward to the new issues.

Your truly,

ELDON SEYMOUR.

A commendable effort, Mr. Seymour.



Eldon Seymour has built this Northrop Glider which has more than 2500 flights to its credit. Seymour flies sometimes by moonlight.

(Continued on page 18)

The 97-Pound Weakling...

who became "The World's Most Perfectly Developed Man"

Everlasting Health and Strength

"I'll Prove to You in 7 Days that YOU, too, Can be this NEW MAN!"

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FREE "FLEW 900 FEET!"

Big 12" all-balsa Glider Free with each "build-It" plane ordered from this ad! Loops, stunts! Fun galore! Read each word of this. Save money by ordering planes in groups. Read below! ORDER!

DIPPER E-Z TO BUILD--- FLIES 900 FEET!

Amazing Dipper costs only 50c postpaid, weighs ⅓ oz., takes off ground. Bob Lataa (Colo.) flew his Comet Dipper 900 Feet! Thousands built, flown! Mailed in big, yellow box. Glider included FREE. Span, 12 1-2 in.; length, 9 1-2 in. ORDER Now! **YOU GET ALL THIS:** Jap tissue, balsa ribs, formers, insignia, wheels, bamboo, special nosepiece, balsa "prop" block, cement, bana oil, all wire parts, rubber motor, full-size drawing, clear instructions. **Quick! Order!**

50c Postpaid

NEW PHANTOM FURY! 13"x10"

This brand-new Terror of The Night Skies is a real big value at only 50c prep'd! Note snappy wheel-pants, streamlined landing gear! **FLIES LIKE THE DIPPER**, and even EASIER to build! Beautifully colored yellow and blue. QUICK! Be FIRST to build, fly Comet's PHANTOM FURY! COMPLETE "build-it" plane with ALL materials, FULL-size plans, E-Z directions, in big box with Free Glider — 50c! Order Phantom in a GROUP of 3, saves you 25c! (See Coupon!)

50c Postpaid

75c

NEW ARMY PLANE! "C-I-Pursuit Made RECORD of 1300 FEET!"

Like Kowalka of Ohio, you can quickly build, fly this Army fighter hundreds of feet! COMPLETE kit in box with Glider, 75c prepd. **Order!**

"MY FLYing Scale HOWARD RACER AVERAGES 750 Feet!"

75c Postpaid

Etherington of N.Y. writes that! Man! This is the flying scale model that's EASY to build, looks real, yet costs only 75c postpaid! **Complete** "build-it" kit in big, color box (and FREE Glider).

Only $1 Prepaid

"Curtiss Robin FLIES 5 TIMES as FAR as DIPPER!" H. Magni, N. Y. Complete kit of new FLYing Scale Curtiss Robin in big box with Free Glider, only $1 prep'd. 17½" x 14". Quick! Order!

"HEATH BABY BULLET LOOKS SWELL and FLIES WELL!" Cummings (Cal.)

Here's FIRST FLYing Scale Heath Bullet selling at $1. Trim. speedy! EASILY BUILT. COMPLETE kit with Free Glider, in big box, $1 prep'd! Order now!

$1

New, F-a-s-t RED RACER!

Your marvelous new Red Racer kit in box is waiting for you! Only $1 prep'd for everything! Glider Free. Order now!

$1

SPECIAL!

3 KITS Each in Big Box $2

SEND COUPON!

COMET,
3114 Harrison
Dept. MM-23, CHICAGO.

☐ C.O.D.; Send "Satisfaction Guaranteed" Groups or planes circled. I'll pay C.O.D. plus postage, on arrival. ☐ CASH. Send "Satisfaction Guaranteed" Groups or planes circled below. I enclose $........ cash. Comet pays postage.

NAME.........................
Street.........................
City.........................
State.... ....

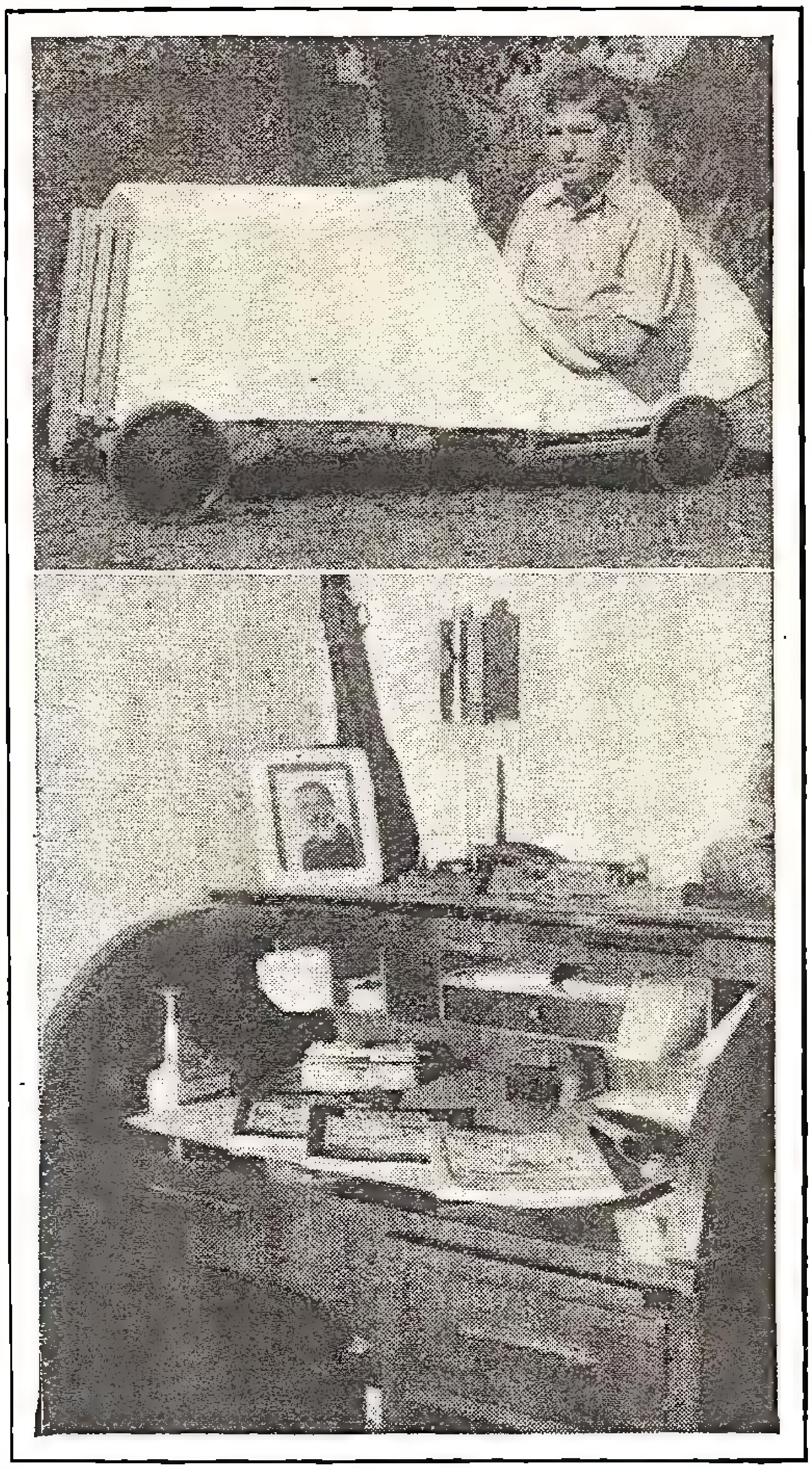
SAVE 25c--Order GROUP of 3 for $2

Put Circle around Group No. or Kit wanted.

Group 1: Dipper, Pursuit, Red Racer. (2) Dipper, Pursuit, Heath. (3) Dipper, Pursuit, Curtiss. (4) Dipper, Howard, Red R. (5) Dipper, Howard, Heath. (6) Dipper, Howard, Curtiss. (7) Phantom, Pursuit, Red R. (8) Phantom, Pursuit, Heath. (9) Phantom, Pursuit, Curtiss. (10) Phantom, Howard, Red R. (11) Phantom, Howard, Heath. (12) Phantom, Howard, Curtiss. **NEW 5-COLOR CATALOG, 3c stamp!** ☐

ANDY'S SHOP MAIL BOX

(Continued from page 16)



Bob Schoonmaker, of St. Paul, has the baby auto hobby. Above is a job he built. Below is his desk with—what! Packmags?—all over it, and the little Packmag steam engine and boiler atop. Note telegraph key and electric motor.

Robert Schoonmaker, St. Paul, sends me a very interesting photo of his den. Being a peeping Tom as most of you are, I'm running this glimpse of another man's personal effects. The letter:

> St. Paul, Minn.
>
> Dear Sirs:
>
> Although the above may sound rather formidable, this should be a friendly letter. After my last rather wordy letter I suppose you thought I'd sink into oblivion (with all the other crabs) but here I am again, and after you as usual.
>
> I've long since decided, that the only way to crash into your column is to do or make something that will make others green with envy. I am sorry that your magazine is so specialized that you can only give room to those with big ideas and correspondingly large pocketbooks. Being rather tired of taking a back seat to a lot of would-be inventors, etc., I constructed a car, as per foto. I hope I

(Continued on page 20)

AUSTRALIA SYDNEY CLEVELAND OHIO-U.S.A. ROME ITALY

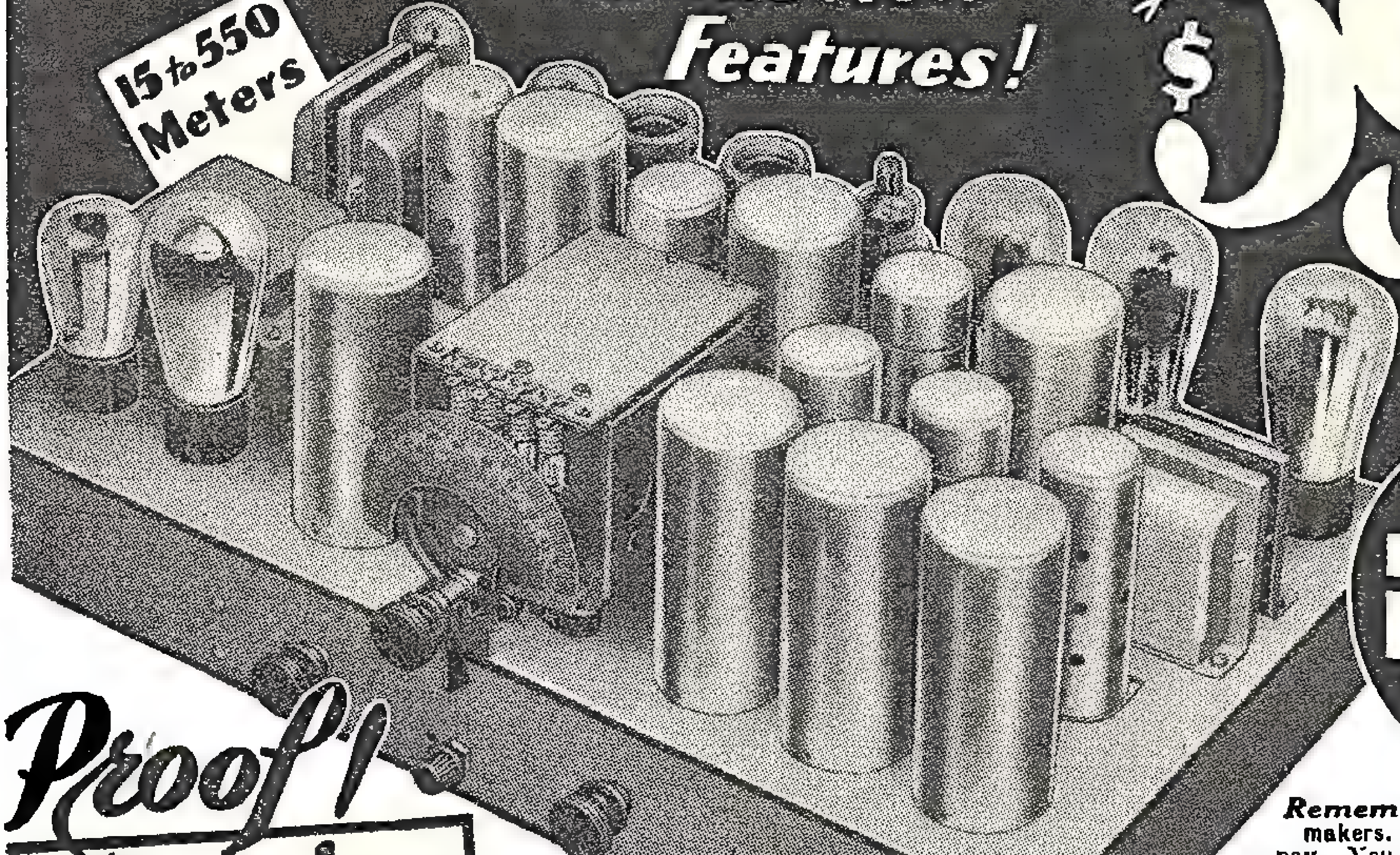
12,000 Mile Range

16 TUBES

All the New Features!

Only $39.95

Completely Assembled with Large Dual Speakers



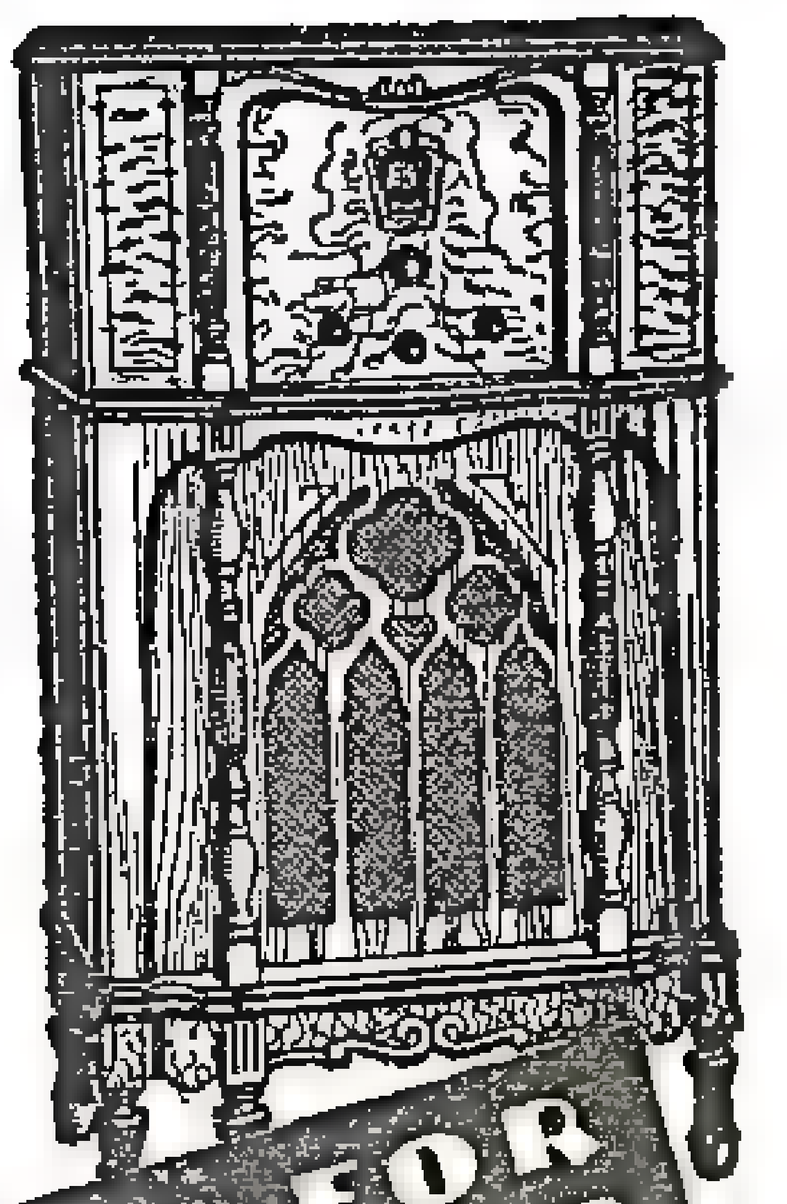
30 DAYS FREE TRIAL

Proof!

Midwest Radio Corp., Cincinnati, Ohio. Gentlemen: "Received the 16-tube outfit. At 3:15 P.M. I started to go after Rome and in a few minutes' playing with the Color-lite dial, I received this station. This afternoon, I picked up Pontoise, France (W8XK), Rome, Italy (12-RO), Mexico City (XDA), Chelmsford, England (G5SW). Have also picked up YVQ, LSN, VK2ME (Sydney, Australia). Sunday morning, Sydney, Australia, Germany, Italy, France and Mexico were all coming in good." Yours very truly, Louis Cseh, 13605 Englesmere Ave., Cleveland, Ohio, U.S.A. Member International Short Wave Club.

DON'T be satisfied with less than a big, powerful 16-tube Midwest ALL-WAVE set. A receiver covering only half the regular broadcast waves is only *half* a set. When you own this latest Midwest marvel, with a tuning range of 15 to 550 meters, you can hear regular and short wave broadcasts from all over the U. S. and many foreign lands. Midwest users from coast to coast report picking up England, France, Germany, Italy, Africa, South America, Hawaii, Japan, Australia, the Philippine Islands and many other far-away stations. This powerful, clear-toned, perfectly controlled set opens up new delights of radio to every listener. Such selectivity, such sensitivity, such amazingly faithful tone reproduction will delight the most critical. Don't buy any radio until you get the new 1933 Midwest catalog. Send for it today. Mail the coupon or write us a postal . . . NOW!

Remember, you **buy direct from the makers.** No middlemen's profits to pay. You get an absolute guarantee of satisfaction or money back. You try any Midwest 30 days before you decide to keep it. Then, if you wish, you can pay in small monthly amounts that you'll scarcely miss. Mail coupon for full details, or write us a postal.



World-Wide Reception!

The Midwest 16-tube ALL-WAVE is the last word in radio completeness and efficiency. This latest 1933 sensation incorporates all the worthwhile new features . . . New type tubes . . . Stat-omit tuning silencer . . . Color-lite tuning . . . Full-floating condenser . . . 18 tuned circuits (Super-heterodyne), 9 in cascade . . . Dual power, two separate transformers . . . Large dual speakers . . . Duplex Duo-diode detection . . . Class "B" Amplification . . . and many other sensational new refinements and improvements. You'll be amazed and delighted when you hear one of these wonderful new sets in your own home.

Deal Direct With Factory—Save Up To 50%

Why buy the costly old-fashioned way and pay two or three profits? Buy direct from the Midwest factory and keep the middlemen's profits in your own pocket. Investigate! Mail the coupon. Learn how we give you a bigger, better, more powerful, clearer-toned radio at a positive saving of 30% to 50% of usual retail prices. Costs only a stamp to find out. Mail the coupon or write us a postal—NOW!

MIDWEST RADIO CORP.

Dept. 177 **[Est. 1920]** **Cincinnati, Ohio**

RUSH THIS COUPON FOR AMAZING FREE TRIAL OFFER AND BIG BEAUTIFUL CATALOG

USER AGENTS EASY EXTRA MONEY
Check here for details. ☐

Midwest Radio Corp.
Dept. 177
Cincinnati, Ohio.

Without obligation on my part send me your new 1933 catalog, and complete details of your liberal 30-day free trial offer. This is NOT an order.

Name..

Address..

Town.................................... State....................

Genuine
UNDERWOOD
Below ½ Mfg's. Original PRICE
(Refinished)

Underwood
New Low Price! Now Only $39⁹⁰ Cash
Regular $102.50 Model
Easiest Terms Ever Offered

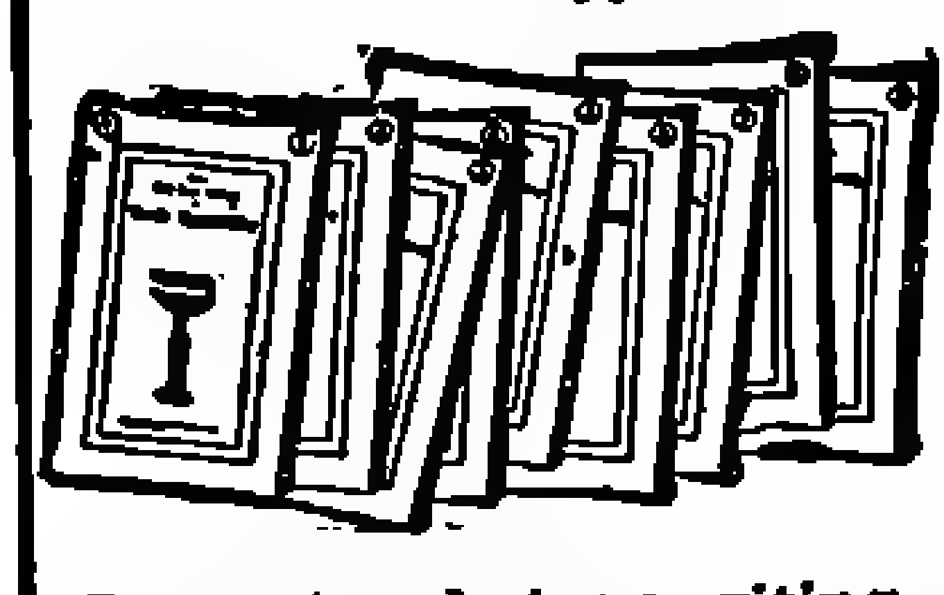
Famous
Model No. 5
NOW ONLY $1 DOWN

Think of it—over 2 million buyers paid $102.50 (cash) for this model No. 5 now offered direct-to-you at way below ½ original price—and on easiest terms besides. Positively the greatest bargain ever offered. Accept the special 10-day trial offer and be convinced. See the neat, perfect work it does—compare its bright, shiny newness without risk. Recognized as the *finest, strongest* typewriter built.

Easy Terms—only 10c a day

Here is positively the chance of a lifetime to own a World-famous Standard Underwood No. 5 completely refinished at the very lowest price and easiest terms. All complete with modern improvements including standard 4-row keyboard, back spacer, automatic ribbon reverse, shift lock, 2-color ribbon, etc. Ideal for business and professional men—teachers, students, story writers, etc. Don't let this chance pass by.

Learn Touch Typewriting



Learn touch typewriting free! Complete (home study) course of famous Van Sant System given with this offer. Fully illustrated—easily learned.

10 Day Trial

You save over $60 by quick action. These genuine guaranteed Underwoods now only $39.90 (cash) while limited supply lasts. Only $1 down brings the Underwood for 10 days' trial. If you keep it—only 10c a day soon pays for your Underwood on our new low price and easiest terms. Send at once before this special offer is withdrawn. Remember every machine fully guaranteed and sent on 10 day trial.

International Typewriter Exchange
231 W. Monroe St., Chicago, Dept. 205,

I enclose $1 deposit. Send Underwood No. 5 (F.O.B. Chicago) at once for 10 days' trial. If I am not perfectly satisfied I can return it express collect and get my deposit back. If I keep it I will pay $3 a month until I have paid $44.90 (term price) in full.

Name .... Age......
Address ....
Town .... State..............

ANDY'S SHOP MAIL BOX

(Continued from page 18)

can squeeze into your column this way, so please give me a break and print at least one of the pix in your next issue. One is of my car and one is my den where I am writing this letter. Notice the three Packmags on the desk and the three corresponding projects on the top. Steam engine, telegraph key, and motor (all doing nicely, thank you).

Hopefully yours,

ROBERT SCHOONMAKER.

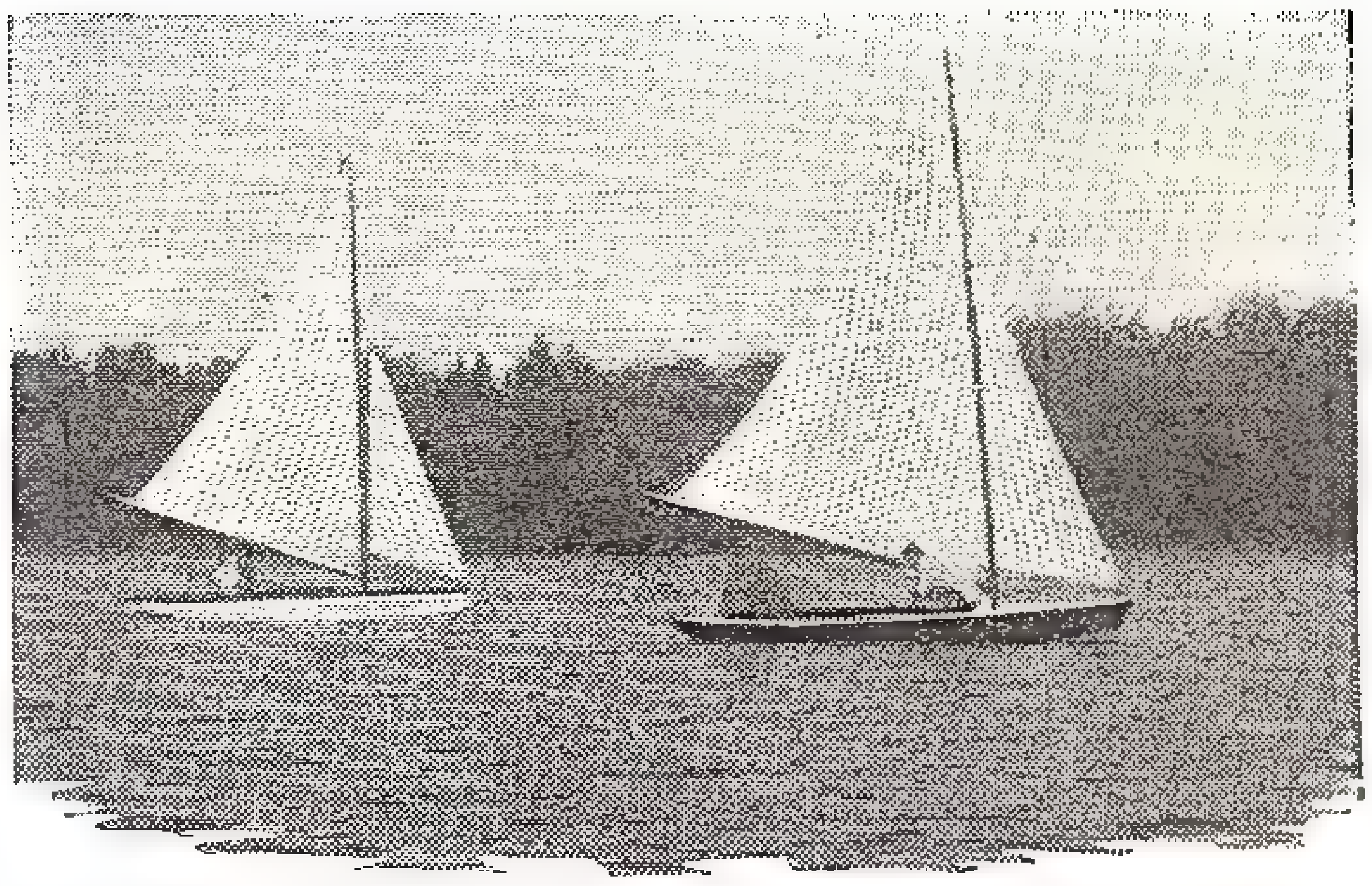
Another reader has gone and done something interesting.

Conversion of the Packard Diesel aircraft engine into a two-cycle engine in place of a four-cycle has been accomplished in experiments conducted over the past two months by Byron Cudd of Menominee. A model incorporating all of the points of the idea has not been completed, but an experimental engine has been made to work efficiently enough to show the idea to be sound.

Mr. Cudd in his Cudd Two-Cycle engine proposes to clear the cylinder of exhausted gases for successive firings by permitting the piston head at the limits of its downward movement to clear the openings of two ports at the base of the cylinder. Compressed air from the supercharger entering the intake valve will then force the expended gases through the ports prior to the upward movement of the piston which will close the ports and compress the fresh air preparatory to a second firing. By this means the cylinder is fired at each upward stroke of the piston, thereby increasing the ratio of horsepower to engine weight.

The Packard Diesel weighs 510 pounds and at 1,950 r.p.m. develops 225 h.p. The weight per horsepower is 2.26 pounds. Mr. Cudd estimates that a two-cycle engine embodying his idea will weigh 510 pounds and at 1,950 r.p.m. will develop 400 h. p. with a weight per horsepower of 1.27 pounds. A two-cycle Diesel weighing 315 pounds at the same r.p.m. will develop 210 h.p. with a weight per horsepower of 1.50. The Kinner four-cycle gasoline engine weighs 420 pounds, develops 210 h.p. with a weight per horsepower of 2 pounds.

Thus the Diesel, with the adaptation of Mr. Cudd's idea, will be able to develop more horse-



One boat builder in Maine has built a class of five Sunrays—the Rabl design which ran in the 1930 How-to-Build-It. Look nice, don't they?

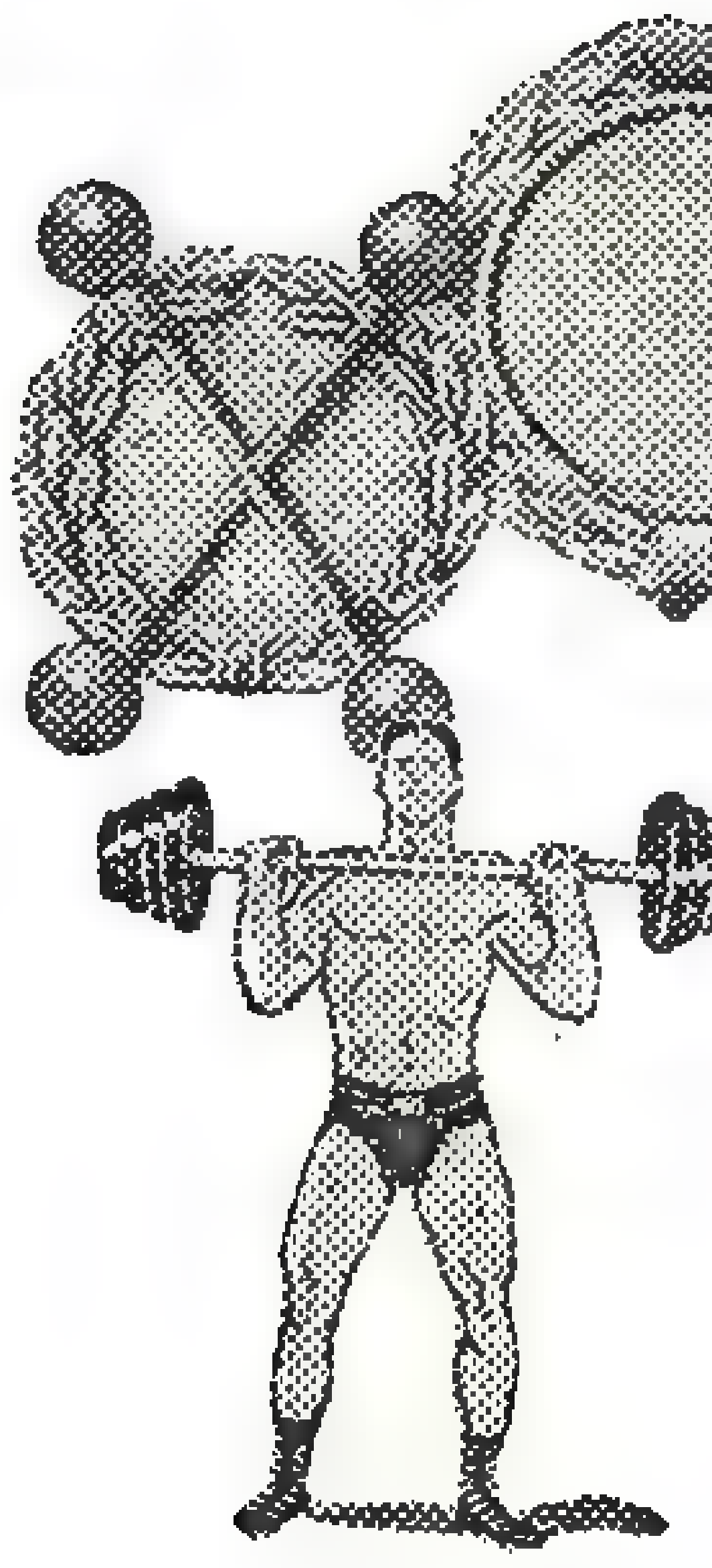
(Continued on page 30)

»»»» JOE MILLER ««««

AMERICA'S STRONGEST MAN

IN THE 165 POUND CLASS, SAYS

"I owe everything to George F. Jowett"



JOE MILLER
is the Strongest 165-Pound Weight-Lifter in the World

Joe Miller holds many national records on the Olympic lifts. He has "jerked" over 290 pounds and "cleaned" over 300! He says—"George F. Jowett is my ideal—in fact, it is to him that I owe all my strength and development"

GEORGE F. JOWETT
Holds more Strength Records than any other Man!

George F. Jowett is responsible for such famous weight lifters as Joe Miller, D. Bachtell, Art Levan, Larry Campbell, Bob Mitchell and A. Sundberg—they are all his pupils and many of them won great honors at the Olympic Games!

What I Did For Him .... I Can Do For YOU!

I EXPECT still greater things of Joe Miller... one of the greatest weight-lifters I have ever trained, and Joe is only one of thousands who have come to me for instruction and have taken my course in physical training.

When I see men like Art Levan, Joe Miller, D. Bachtell, Bob Mitchell and others excell in weight lifting contests whenever they compete, it makes me feel mighty proud!

Proud to think that there are more than 10,000 men who have taken my course in physical training in the last four years. Many of the strong man "phenomenons" were boys who came to me as weaklings... and what I have done for them I can surely do for you!

I know you feel the urge for a strong man's body and I want to tell you right now that I can give you mighty muscles too ... arms that will ripple with steel bands... a back with powerful blades that will give you a K.O. punch..., a barrel chest and legs that will be columns of power for speed and endurance! A physique that men will respect and women admire.

So sure am I that I can do all that I say, that I make this unqualified guarantee... the guarantee that no strong man has ever before DARED to make!

"I will add 3 INCHES TO YOUR CHEST
2 INCHES TO YOUR BICEPS
... or it won't cost you one penny..
even the postage you have spent will be refunded!"
Signed GEORGE F. JOWETT

While my full course only costs a few cents a day, I want you to try one of my test courses first...

Send for "Moulding a Mighty Arm"
A Complete Course for only 25c

It will be a revelation to you. You can't make a mistake. The guaranty of the strongest armed man in the world stands behind this course. I give you all the secrets of strength illustrated and explained as you like them. In 30 days you can get an unbreakable grip of steel and a Herculean arm.

Try any one of my test courses listed in the coupon at 25c. Or, try all six of them for only $1.00

MAIL YOUR ORDER NOW AND I WILL INCLUDE A FREE COPY OF "NERVES OF STEEL, MUSCLES LIKE IRON."

It is a priceless book to the strength fan and muscle builder. Full of pictures of marvelous bodied men who tell you decisively how you can build symmetry and strength the equal of their own. Reach out... Grasp This Special Offer.

FREE BOOK WITH PHOTOS OF FAMOUS STRONG MEN

NERVES of STEEL MUSCLES like IRON
YOU can have the thrill of being strong!

"Nerves of Steel, Muscles like Iron" SENT FREE!

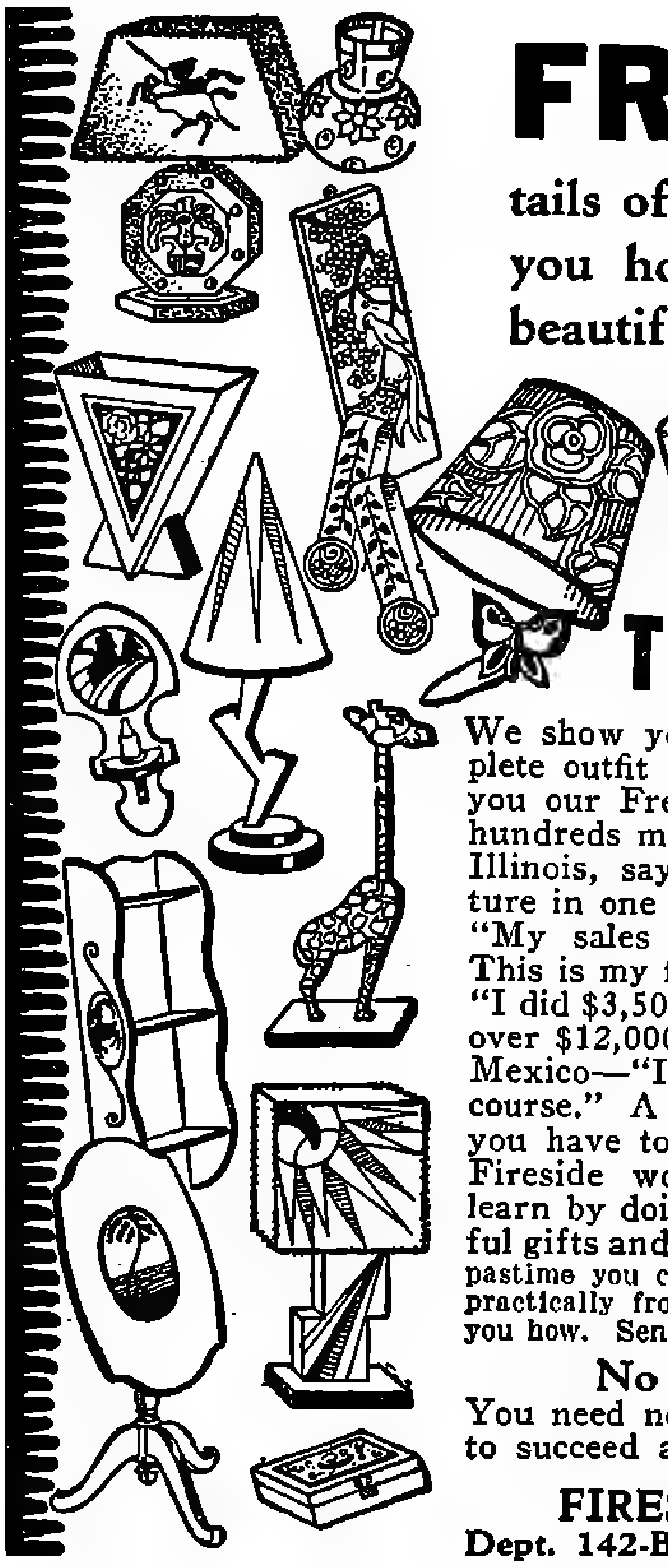
JOWETT INSTITUTE of PHYSICAL CULTURE
Dept. 37 Pb 422 Poplar St.
Scranton, Pa.

George F. Jowett: Your proposition looks good to me. Send, by return mail, prepaid, the courses checked below for which I am enclosing ________

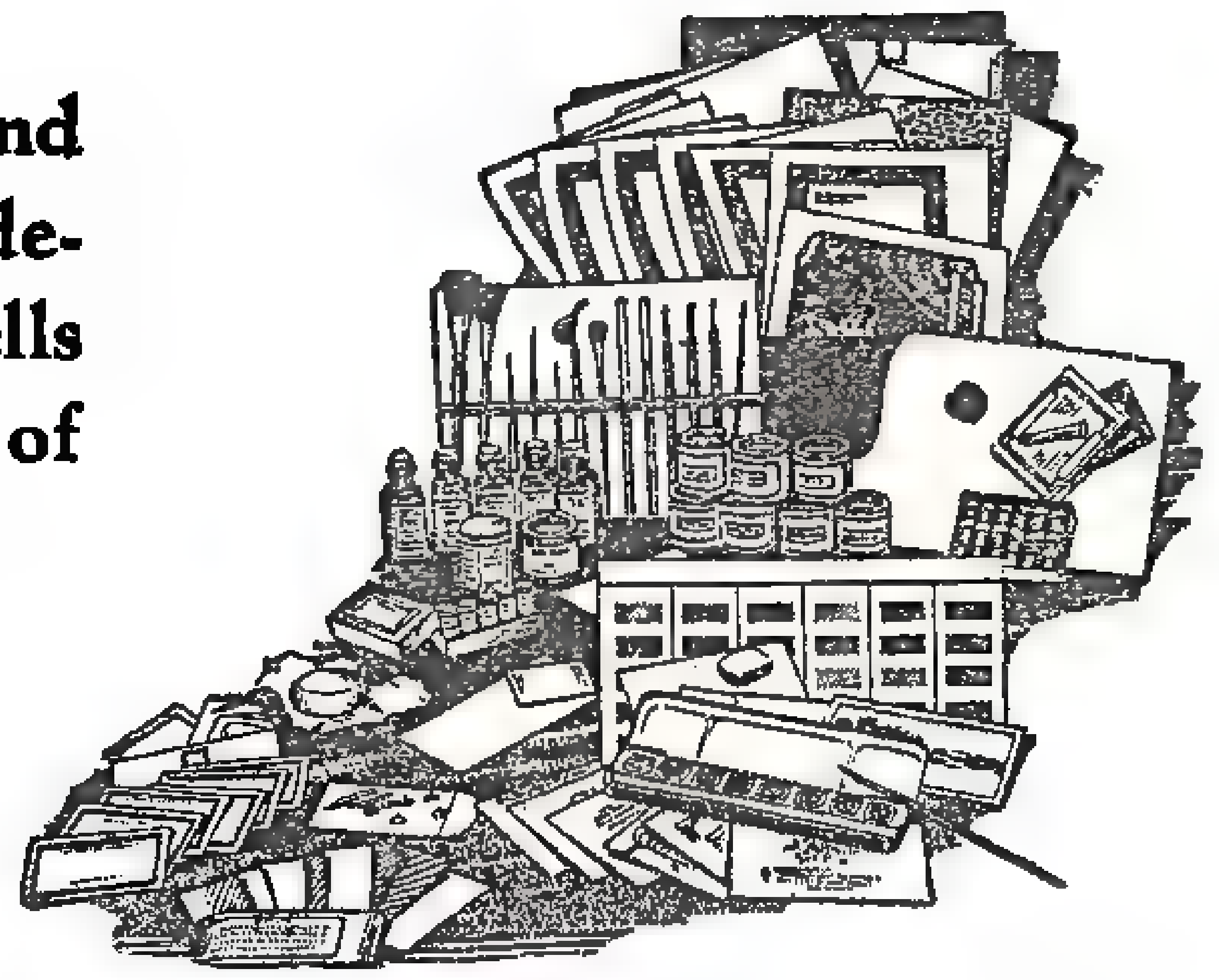
- ☐ Moulding a Mighty Arm, 25c
- ☐ Moulding a Mighty Back, 25c
- ☐ Moulding a Mighty Grip, 25c
- ☐ Moulding a Mighty Chest, 25c
- ☐ Moulding Mighty Legs, 25c
- ☐ Strong Man Stunt Made Easy, 25c
- ☐ All 6 Books for $1.00.

Name ________________ Age ______

Address ________________



FREE! of extra cost—send the coupon for details of our amazing new plan. It tells you how to get a big assortment of beautiful gifts that you can paint.



This Magic Box Turns Spare Time Into Money

We show you how and give you the complete outfit illustrated above. Also we give you our Free Idea Book which has started hundreds making easy money! Mrs. H. L., Illinois, says: "I made $100.00 on furniture in one week." Mrs. A. K., Virginia—"My sales were $500.00 for five weeks. This is my first year." R. M. P., Illinois—"I did $3,500 worth of business last year and over $12,000 worth this year." D. W., New Mexico—"I would not take $1,000 for my course." A real desire to make money is all you have to have to make a big success at Fireside work.—No tiresome study—You learn by doing. It is fun decorating beautiful gifts and furniture—the most fascinating pastime you can imagine. You make good money practically from the start. Our FREE book tells you how. Send the coupon for it!

No Experience Needed

You need no experience or business ability to succeed at Fireside work and make excellent money. We help you and show you how. You can join now on the easiest plan ever offered. Get full details today. Coupon brings everything.

FIREESIDE INDUSTRIES
Dept. 142-B Adrian, Mich.

FREE Book on Decoration

Mail the coupon NOW for the beautiful new book on home decoration and money making. It's FREE! A new plan for starting you at good money at once will also be included. Do this at once—while there are openings for new members!

GOOD FOR PLAN

Fireside Industries
Dept. 142-B
Adrian, Mich.

Send me FREE book on decoration and details of your new plan. Also how to get the big artist's outfit.

Name.......................

Address..........................

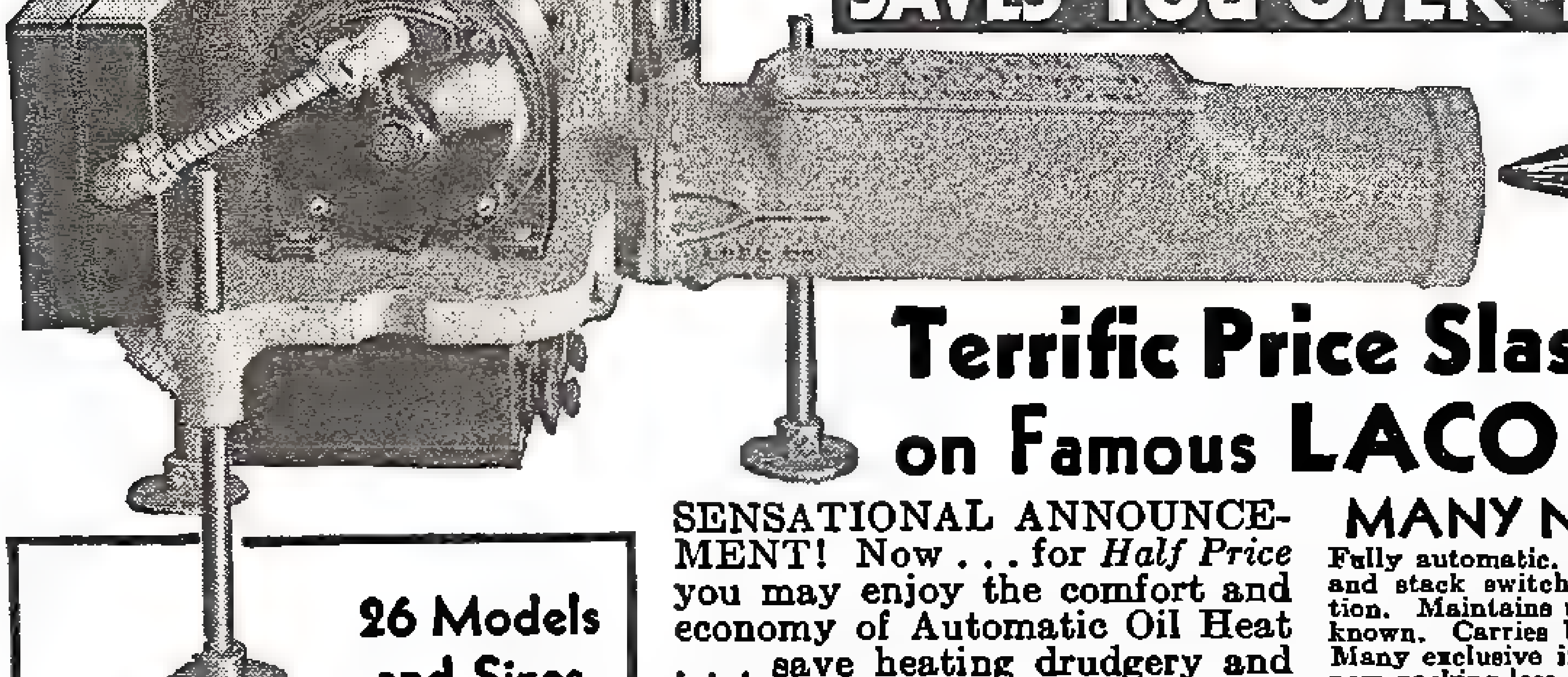
City....................State.........

NOW-Only $126.50 Net Wholesale Price

WAS $235

SAVES YOU OVER $100

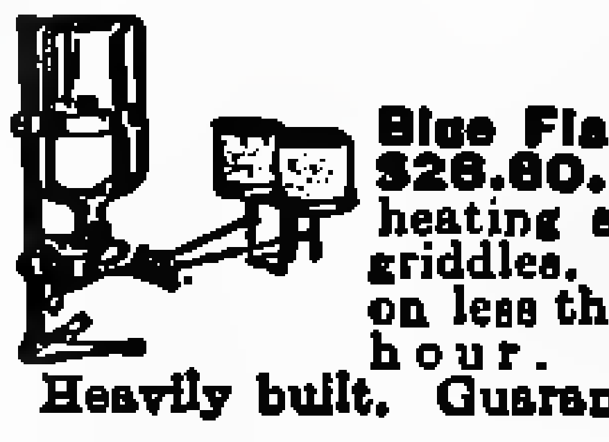
OIL HEAT Cheaper than COAL!



Terrific Price Slash Gives Huge Saving on Famous LACO Atomizing Power Burner

26 Models and Sizes

Mineral Wick type. $58.25. World's lowest priced Automatic oil burner. Thousands in use. Selling like wild-fire. Guaranteed. Easiest to install. Ask about this.



Blue Flame Burner. Only $26.60. For cook stoves, heating stoves, hamburger griddles. Operates on less than 1c an hour. Noiseless. Heavily built. Guaranteed.

Lowest priced quality oil burner. Mineral-wick principle. For stoves, Arcolas, small furnaces. Ample heat. Safe. Guaranteed. Now selling, **low as $9.60.**

SENSATIONAL ANNOUNCEMENT! Now . . . for *Half Price* you may enjoy the comfort and economy of Automatic Oil Heat . . . save heating drudgery and dirt!

World's greatest oil burner offered at Amazing New Low Price. Built and *guaranteed 25 years* by largest exclusive oil burner manufacturer. Wonder heater . . . operates for much less than coal . . . burns cheapest oils (and 24 West Coast Diesel oil.) Quiet. Clean. Safe.

BURNS OIL NEW WAY

LACO'S famous *Quiet-ized Flame* uses amazingly little fuel. Every particle of heat extracted from every drop of oil. Improved diffuser mixes oil and air thoroughly . . . creates a slow spiral floating flame in perfect suspension. Much more efficient than flame which shoots through furnace with a roar, wasting fuel up the chimney.

MANY NEW FEATURES

Fully automatic. Complete with thermostat and stack switch. Operates without attention. Maintains uniform temperature. Safest known. Carries Underwriters Lab. approval. Many exclusive improvements . . . powerful, new packing-less pump—radio-proof coil—indestructible all-brass tubing—new steel long-life electrodes. Only 1 moving part. Easy to install in any heating plant.

GUARANTEED FOR LIFETIME

If, in 25 years, burner fails to give perfect satisfaction due to defective manufacture, we protect you fully.

30 DAYS' FREE TRIAL

Try it, FREE, in your own home. You must be satisfied, or you need not keep burner.

WRITE! Send NOW for free booklets, complete list of New Low Net Wholesale Prices. Give size of home, type heating plant. SEND TODAY!

AGENTS, DEALERS
Send for details of
FREE BURNER OFFER!

Sensational Free Burner offer starts you out! Make $500 to $1000 a month without experience. Every home interested in guaranteed LACO at Amazing New Low Prices. 26 models and sizes suit every need. Valuable factory help given. Start NOW. Try a LACO in your own home, at our risk. Send TODAY!

LACO OIL BURNER CO.
223 Union St., Griswold, Iowa, U. S. A.

Why waste time on *old fashioned methods*

—when you can learn to play at home without a teacher

DON'T let the thought of long years of tiresome practice scare you away from learning to play! Don't let the thought of an expensive private teacher keep you from letting your dreams come true! For you—*anyone*—can easily *teach yourself* to play—right in your own home, in your spare time, and at only a fraction of what old, slow methods cost!

It's *so* easy! Just look at that sketch at the right. The note in the first space is *always* f. The note in the second space is *always* a. The way to know the notes that come in these four spaces is simply to remember that they spell *face.*

Now, isn't that simple? You don't have to know one note from another in order to begin. For the U. S. School way explains everything as *you go along*—both in print and picture—so that, almost before you know it, you are playing *real tunes and melodies* right from the notes.

You simply *can't go wrong.* First you are *told* what to do, then the picture *shows* you how to do it—then you do it yourself and *hear* it. No private teacher could make it any clearer.

Easy as A-B-C

No wonder over 600,000 men and women have learned to play this easy way! For this famous course is based on sound, fundamental musical principles, highly simplified. It's not a "trick" or "stunt" method. You learn to play from notes, just as the best musicians do. You learn to pick up any piece of music, read it, and understand it.

No time is wasted on theories. **You get all the musical** facts. You get the real meaning of musical notation, time, automatic finger control, harmony.

You'll find yourself studying the U. S. School way with a smile. Your own home is your studio. The lessons come to you by mail. They consist of complete printed instructions, diagrams, all the music you need. There are no dry-as-dust exercises to struggle through. Instead, it's just like playing a game—you learn so fast!

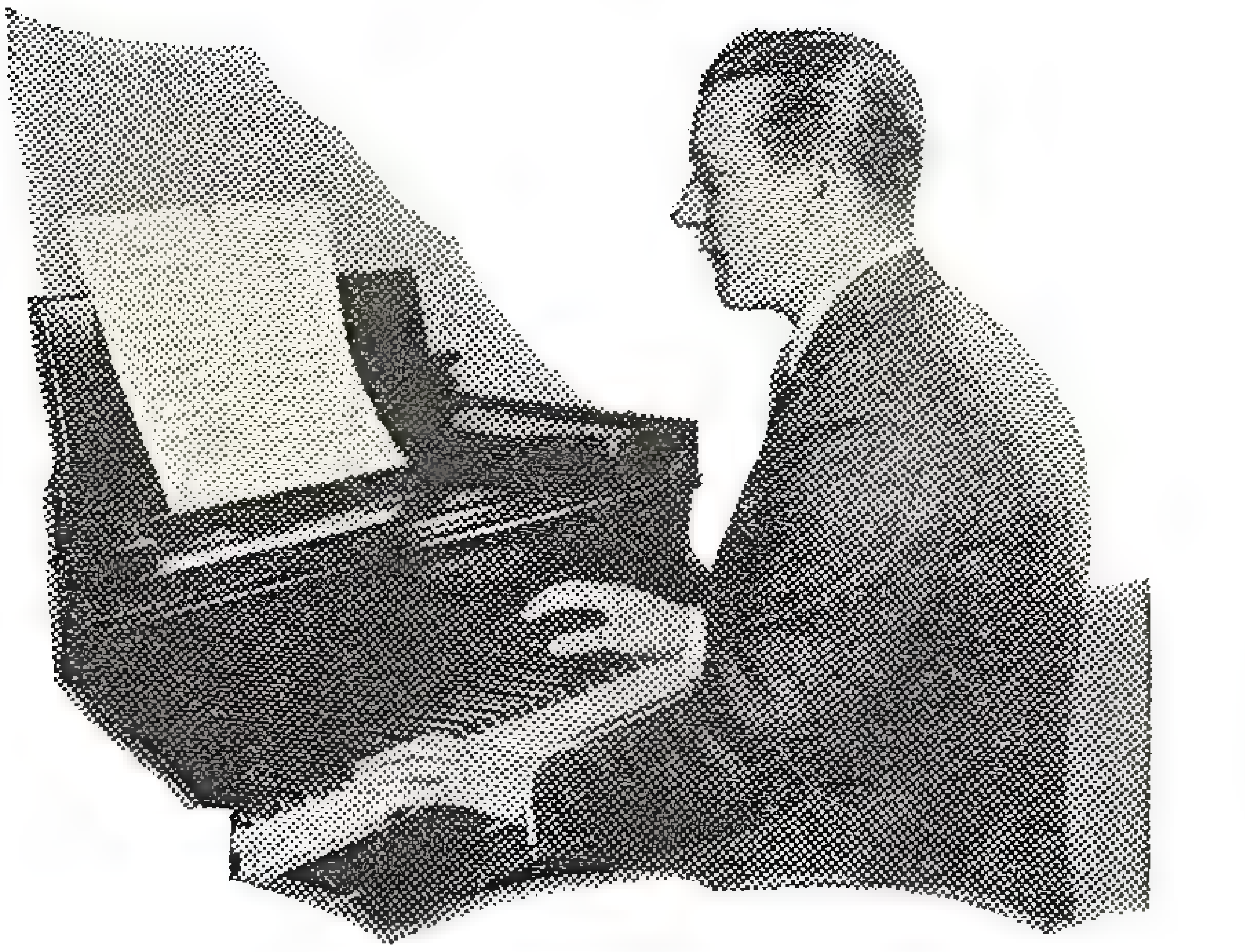
CHOOSE YOUR COURSE

Piano
Organ
Violin
Drums and Traps
Guitar
Mandolin
Harp
Cornet
Piccolo
'Cello
Sight Singing
Ukulele
Hawaiian Steel Guitar
Clarinet
Flute
Saxophone
Trombone
Voice and Speech Culture
Harmony & Composition
Automatic Finger Control
Piano Accordion
Italian and German Accordion
Banjo (Plectrum, 5-String or Tenor)
Juniors' Piano Course

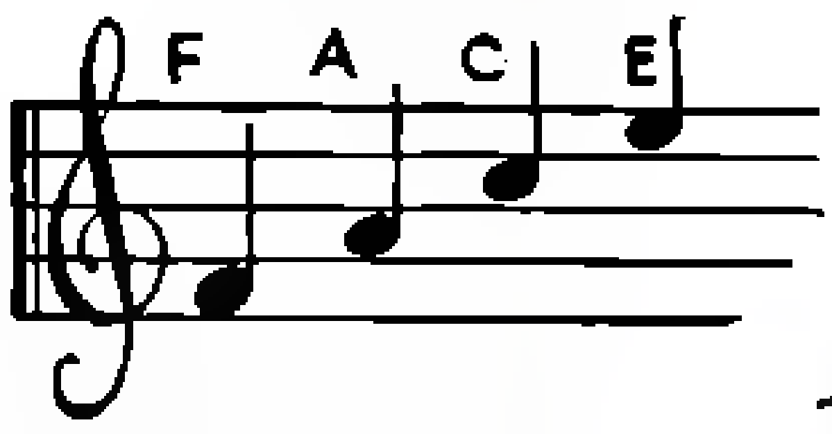
No Talent Needed

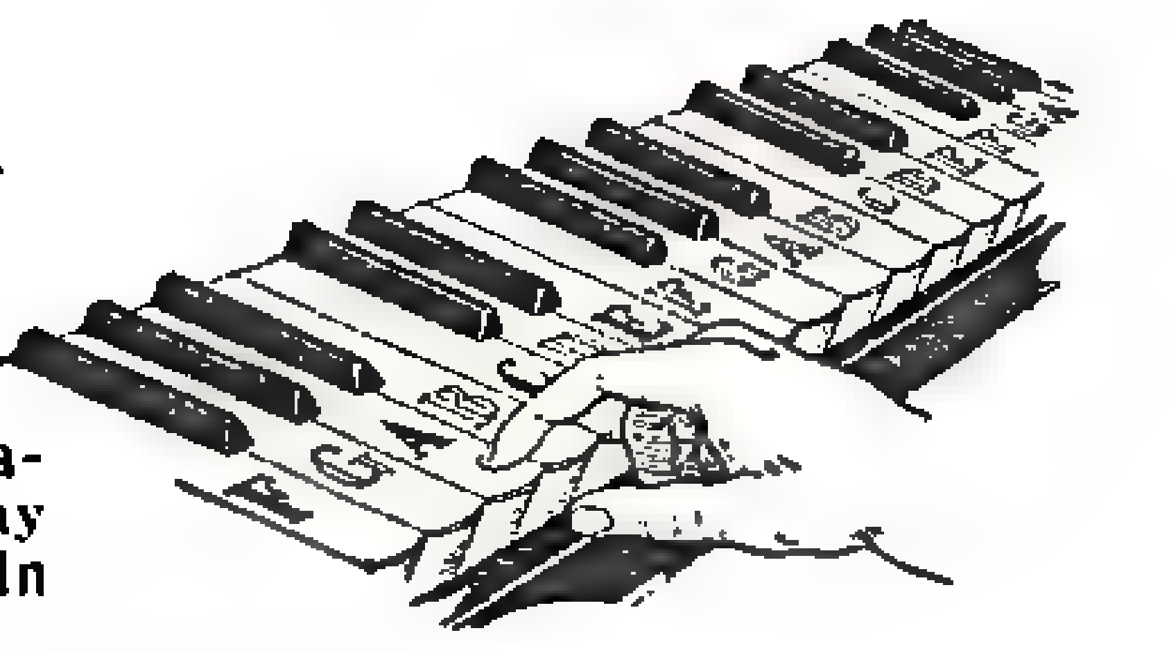
Forget the old-fashioned idea that you need "talent." Just read the list of instruments in the panel, decide which one you want to play, and the U. S. School of Music will do the rest. And remember—no matter which instrument you choose, the cost in each case will average just the same—only a few cents a day.

You'll never regret having learned to play. For those who can entertain with music at parties—who can snap up things with peppy numbers—are always sought after, always sure of a good time! Start **now** and surprise your friends!



Easy as A–B–C





If you can read the alphabet you can learn to play your favorite instrument in just a few months.

Free Book and Demonstration Lesson

"How You Can Master Music in Your Own Home" is an interesting little book that is yours for the asking. With this free book we will send you a typical demonstration lesson that proves better than words, how quickly and easily you can learn to play your favorite instrument by note—in less than half the time and at a fraction of the cost of old, slow methods—the U. S. School way. The booklet will also tell you all about the amazing new **Automatic Finger Control.**

If you really want to play—if new friends, good times, social popularity, and increased income appeal to you—clip and mail the coupon NOW. Instruments supplied when needed, cash or credit. U. S. SCHOOL OF MUSIC, 2622 Brunswick Bldg., New York City.

Thirty-fifth Year (Established 1898)

U. S. SCHOOL OF MUSIC
2622 Brunswick Building, New York City

Please send me your free book, "How You Can Master Music in Your Own Home," with inspiring message by Dr. Frank Crane, Free Demonstration Lesson, and particulars of your easy payment plan. I am interested in the following course—

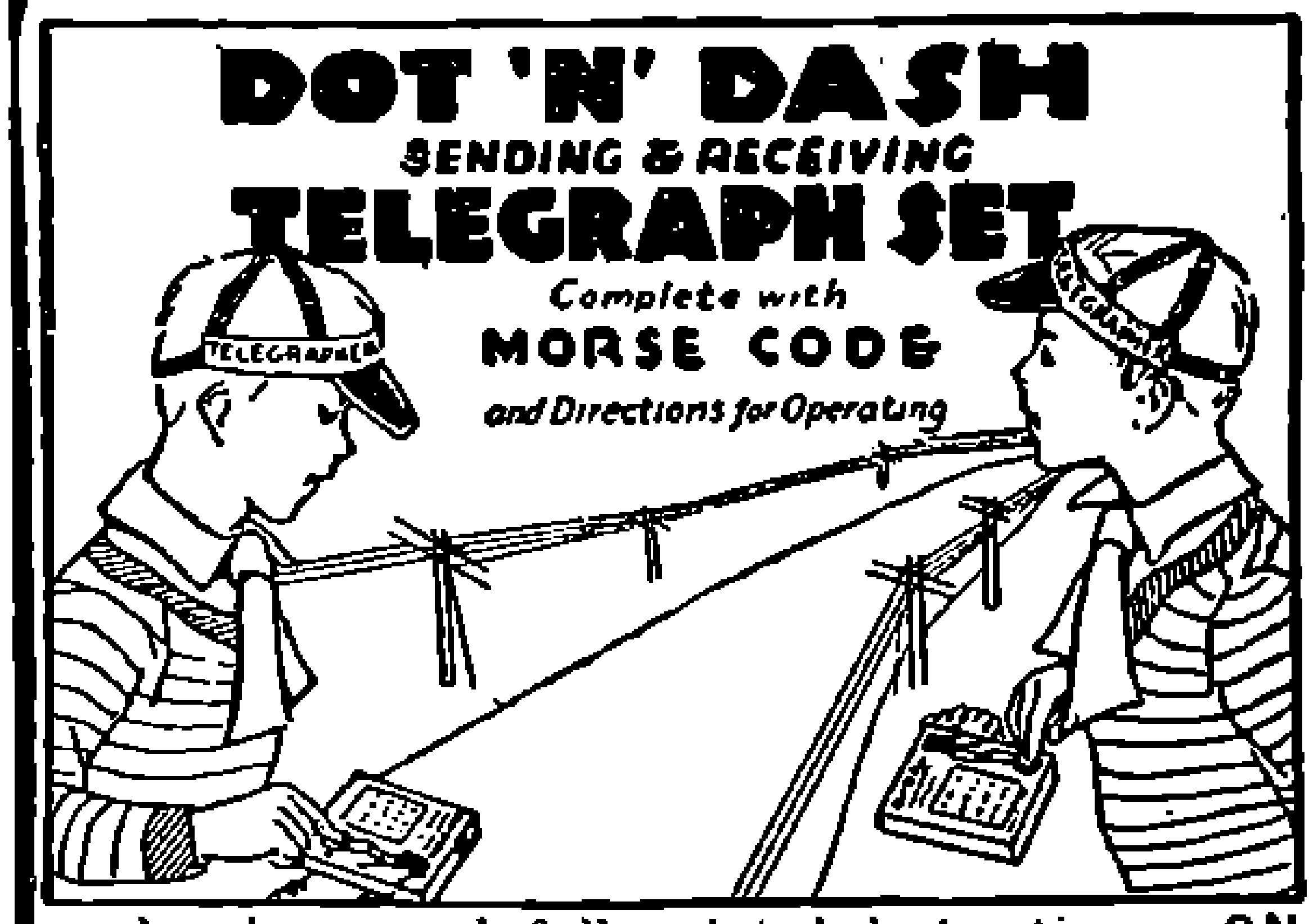
.... Have you instrument?........

Name..

Address ....

City.................................... State...............

THIS ELECTRIC TELEGRAPH SET 15c



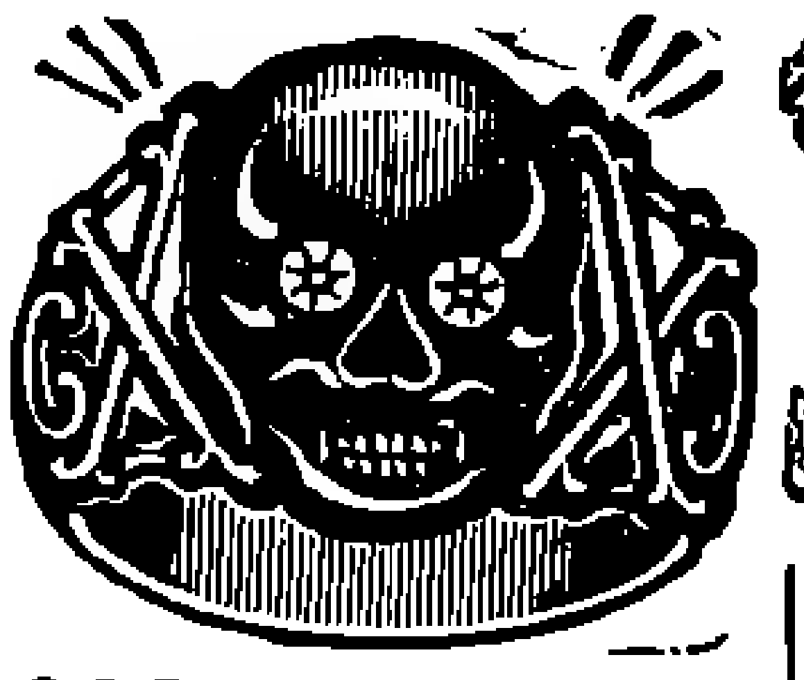
BOYS! Have a private telegraph system of your own! Lots of fun sending messages to friends. A very reliable outfit that sells for 15c. Get two sets, using one for sending and the other for receiving. With this outfit you can learn to transmit and receive messages by the Morse International Code, and in a very short time become an expert operator. Measures 4 x 3 inches, first class construction throughout, complete with key, sounder and magnet, Morse Code printed on wooden base, and full printed instructions. **ONLY 15c each set postpaid.**

JOHNSON SMITH & CO., Dept. 919, RACINE, WIS.

ONLY 10c Per Pair

Fighting Roosters

With very little practice you can make these miniature models of Game Roosters imitate in the most life-like manner the evolutions of a **FIERCE COCK-FIGHT.** Endless amusement. Well made, with real feathers. **Pair 10c. 3 prs. 25c. postpaid.**



GOOD LUCK RING

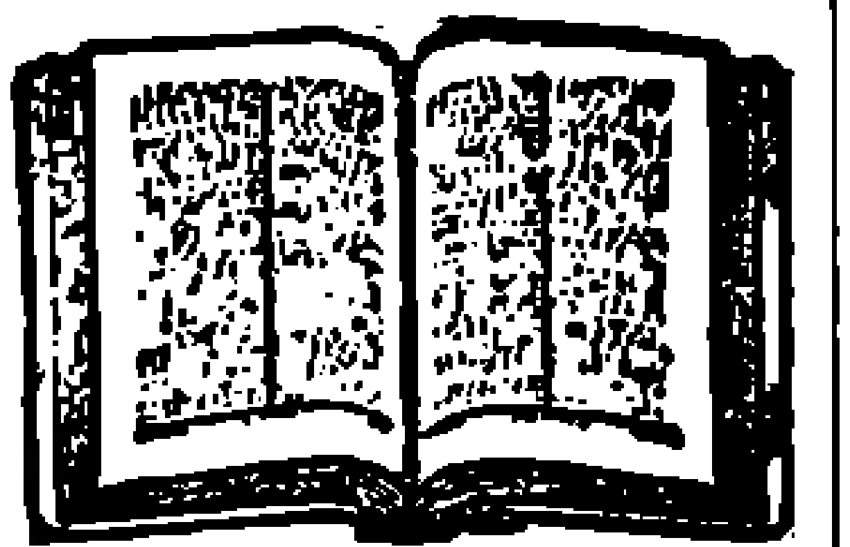
Very striking, quaint and uncommon. Silver finish; skull and crossbones design, two brilliant, flashing gems sparkle out of the eyes. Said to bring good luck. **Only 25c ppd.**

Exploding Cigarettes

Box contains ten genuine cigarettes of excellent quality. They appear so real, but when each cigarette is about one-third smoked, the victim gets a very great surprise as it goes off with a loud BANG! A great mirth provoker yet entirely harmless. **Price 25c box.**

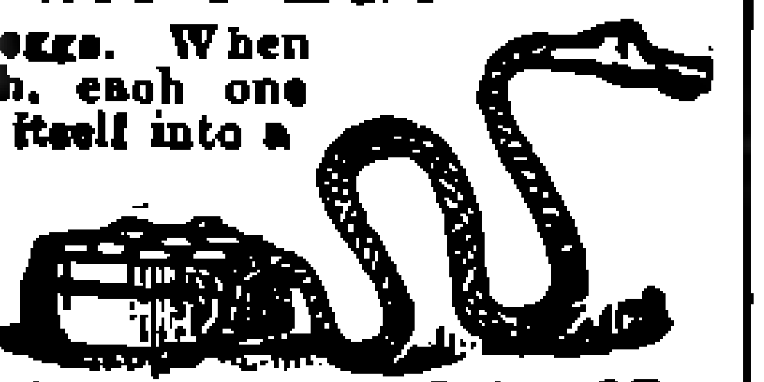
MIDGET BIBLE

GREAT CURIOSITY



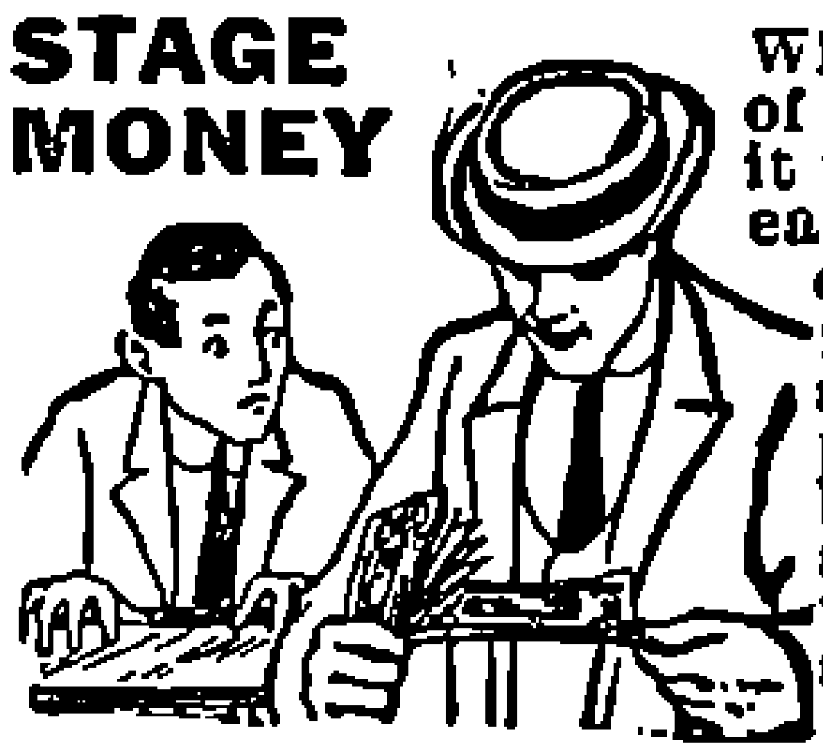
Smallest Bible in the World. Size of a postage stamp. 200 Pages. Said to bring good luck to the owner. A genuine work of art. Must be seen to be appreciated. Make good money selling them to friends, church acquaintances, etc. PRICE 15c each. 3 for 40c, 12 for $1.35, 100 for $7.50. Also obtainable in Leather Binding, with gold edges. **Price 50c each, 3 for $1.25, $4.50 per doz. Magnifying Glass** for use with Midget Bible **15c**

SERPENT'S EGGS



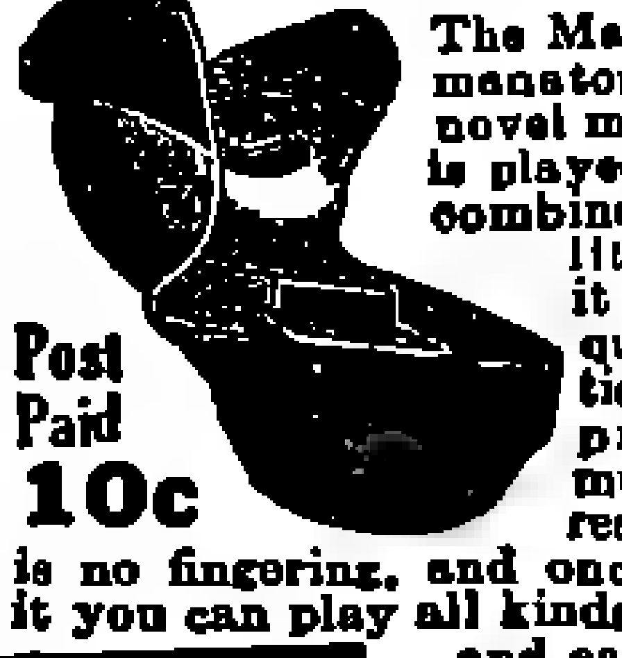
Box contains 12 eggs. When lit with a match, each one gradually hatches itself into a snake several feet long, which curls and twists about in a most life-like manner. **Price per box. 10c postpaid. 3 for 25c.**

STAGE MONEY



With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. **Prices, postpaid: 40 Bills 20c, 120 for 50c, or $3.50 thousand postpaid.**

NOSE FLUTE



Post Paid 10c

The Magic Nose Flute, or Humanatone, is a unique and novel musical instrument that is played with nose and mouth combined. There is just a little knack in playing it which, when once acquired after a little practice, will enable you to produce very sweet music that somewhat resembles a flute. There is no fingering, and once you have mastered it you can play all kinds of music with facility and ease.

JOHNSON SMITH & CO.

SURPRISE MATCHES

More fun than fighting with your wife. Look just like ordinary matches. As the victim tries to light one he gets quite a surprise. **10c**

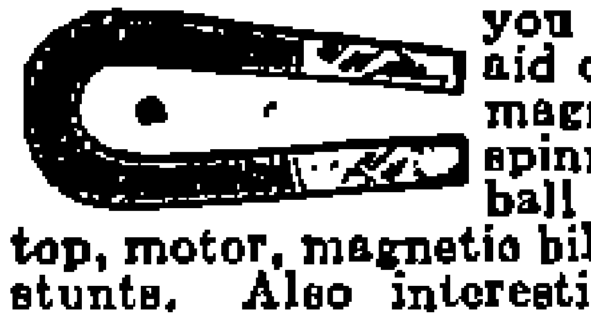
Price 10c per box, 3 boxes for 25c, 12 for 75 cents.

STAR TOY MAKER

Greatest boys' book written. Tells how to make a Pinhole Camera, a Canoe, model Railroad, a Telephone, Boomerang, Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, Water Wheel, Paddle Raft, a pair of Skis, a Dog Sled, Bird House, Rabbit Yard, etc. 64 pages. 150 illustrations. **PRICE 10c.**

BOY'S OWN TOYMAKER. A new book. Tells how to make chemical toys, electrical toys, galvanic toys, mechanical toys, paper toys, cardboard toys, boats, traps, etc. 200 illustrations. **Price 25c postpaid.**

FUN WITH MAGNETISM. 50 novel and unique experiments in **MAGNETISM** that you can perform with the aid of an ordinary magnet: magnetic chain, fleeing and spinning needle, nail and ball cluster, magnetic fish, top, motor, magnetic billiard balls, many other stunts. Also interesting information about lodestone, magnetism, electricity, etc. **PRICE 10c p.pd.**



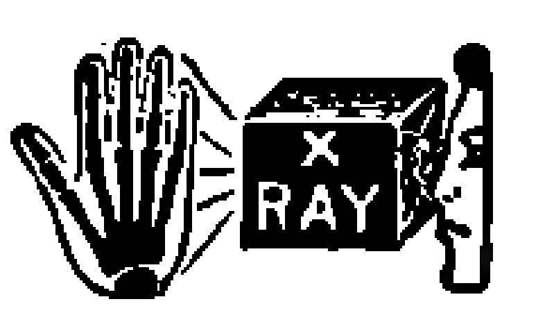
BOOK ON BOATS. How to build rowing, sailing boats. Everything pertaining to boats explained in plain terms so anyone can understand. Illustrated. **10c p.pd.**

5-MINUTE HARMONICA COURSE. A new easy self-teaching method. Teaches how to play, to use the tongue, tremolo, fully illustrated. **Price 15c postpaid.**

MONEY MAKING SECRETS. Golden opportunities for everyone. 64 page copyrighted book chock full of money-making ideas, recipes, formulas, wrinkles, trade secrets, etc. Businesses that can be started with little or no capital at home in spare time. **10c postpaid.**

TRICKS & SOCIAL ENTERTAINER. Contains hundreds of simple tricks, illusions, diversions that anyone can do. Also explains secret of second sight. **Price 25c postpaid.**

WONDERFUL X-RAY TUBE



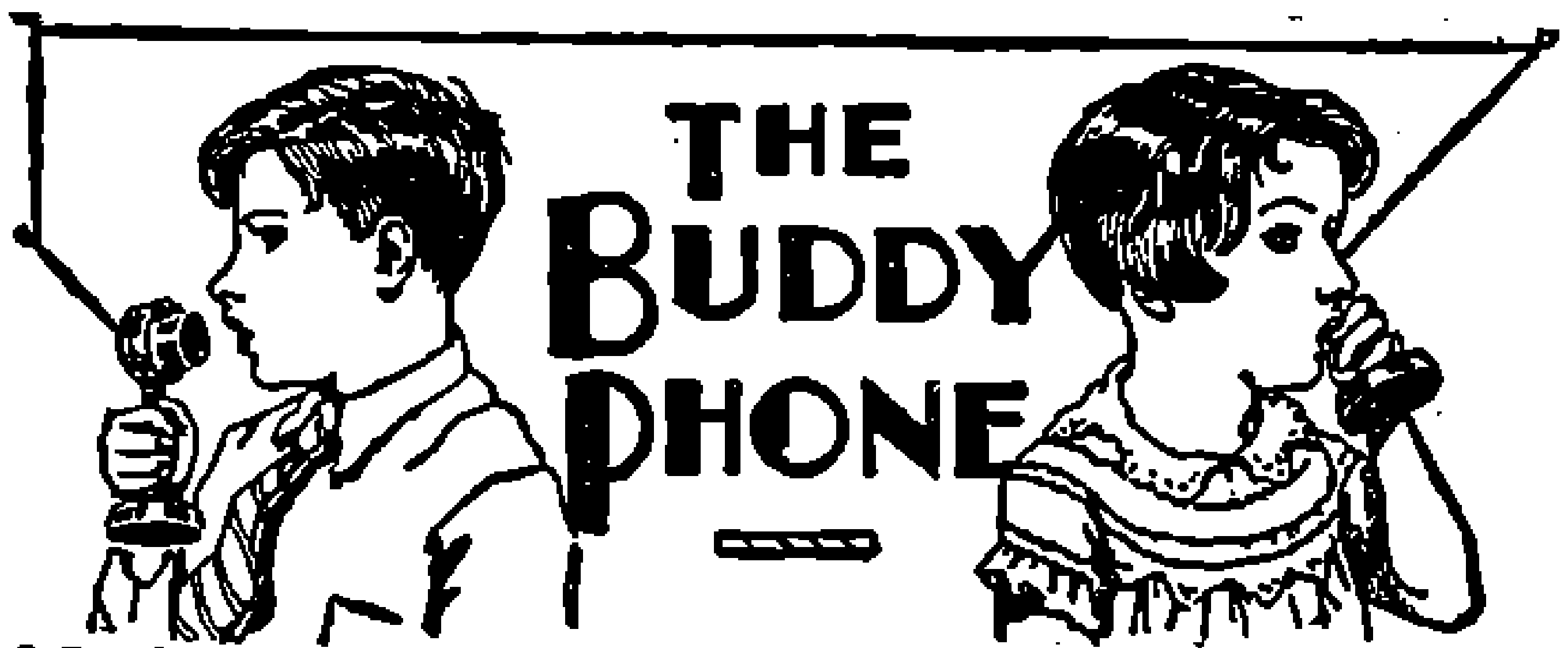
A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, the lead in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. **Price 10c, 3 for 25c.**

LATEST CATALOG
JOHNSON SMITH & CO.
RACINE WIS.

JOHNSON SMITH & CO.

Dept. 919 **RACINE, WIS.**

A De Luxe Edition of our 1933 CATALOG mailed on receipt of 25c. Handsome binding. Bigger and better than ever. Only book of its kind in existence. Nearly 800 pages of all the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, rubber stamps, unusual and interesting books, curiosities in seeds and plants, etc., unprocurable elsewhere.* Remit by Coin, Money Order, Check or unused U. S., Canadian and Foreign Stamps for all articles listed above. *See next page also.*

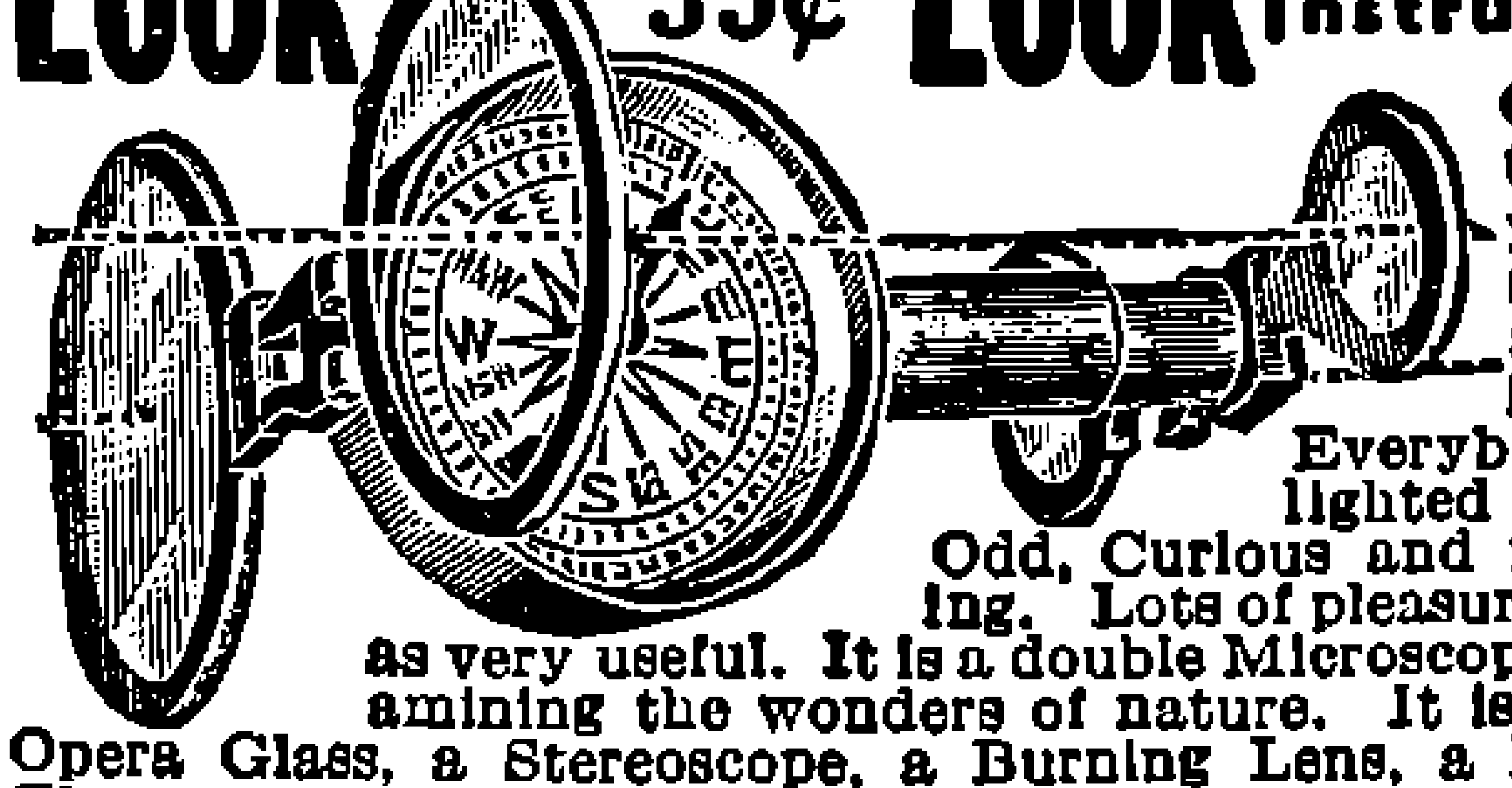


A Real Telephone. Works Indoors or Outdoors. 100 ft. or 1000 ft.

Though this is merely a very clever toy, it is quite as serviceable for short distances as the most elaborate apparatus made and it is much less liable to get out of order or to need adjustment; in fact it cannot be rendered inefficient unless roughly handled. No troublesome battery, no intricate "hook-up." Can be put to practical use from one room to another, up or down stairs, around corners, etc. The patented sounding discs transmit and receive the voice perfectly, making it a really practical talking telephone. Set consists of two phones, transmission cord and full instructions. **PRICE ONLY 65c per set postpaid. JOHNSON SMITH & CO.**

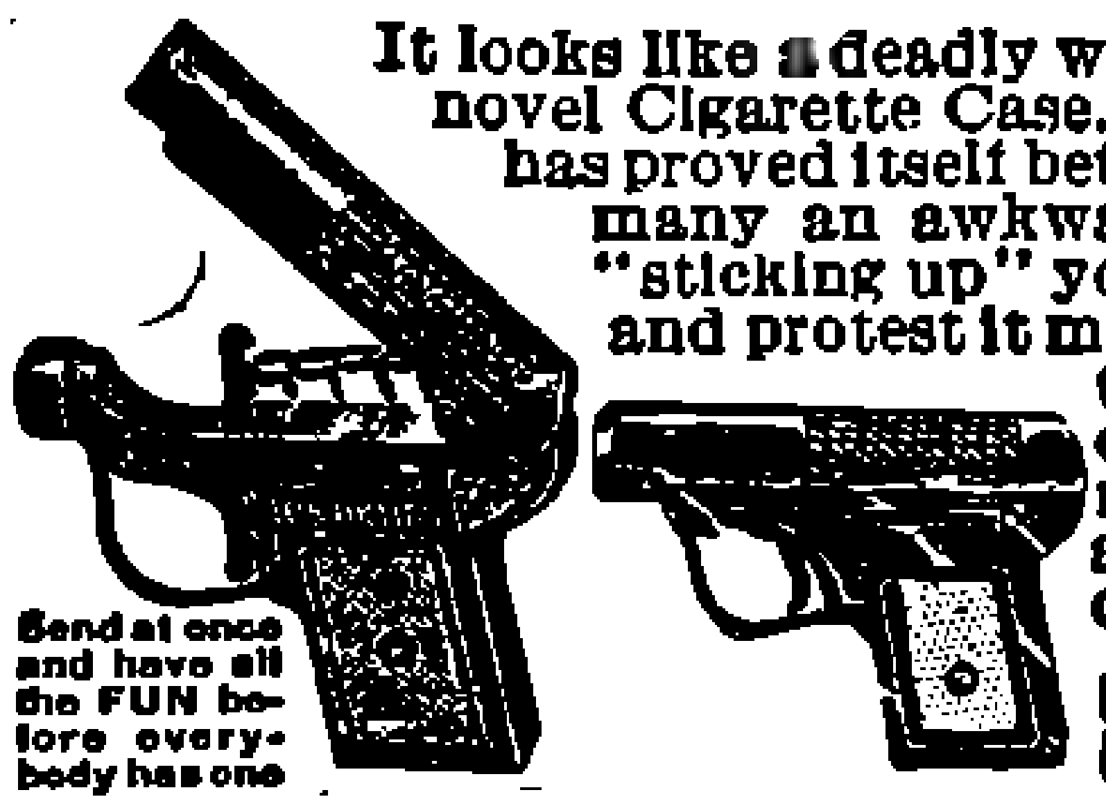
LOOK 35¢ LOOK

Wonderful instrument.



Greatest thing yet. Nine separate articles in one. Everybody delighted with it. Odd, Curious and Interesting. Lots of pleasure as well as very useful. It is a double Microscope for examining the wonders of nature. It is also an Opera Glass, a Stereoscope, a Burning Lens, a Reading Glass, a Telescope, a Compass, a pocket Mirror, and a Laryngoscope—for examining eye, ear, nose and throat. It is worth all the cost to locate even one painful cinder in the eye. Folds flat and fits the pocket. Something great—you need one. Don't miss it. Sent by mail. **Only 35c or 3 for $1.00.**

PISTOL CIGARETTE CASE



Send at once and have all the FUN before everybody has one

It looks like a deadly weapon, but it is merely a novel Cigarette Case. This clever contrivance has proved itself better than the real thing in many an awkward encounter. Great fun "sticking up" your friends. They squirm and protest it might be loaded. Pull the trigger and the slide flies open disclosing the cigarettes. Well made, light and compact. Weight only 2 ounces.

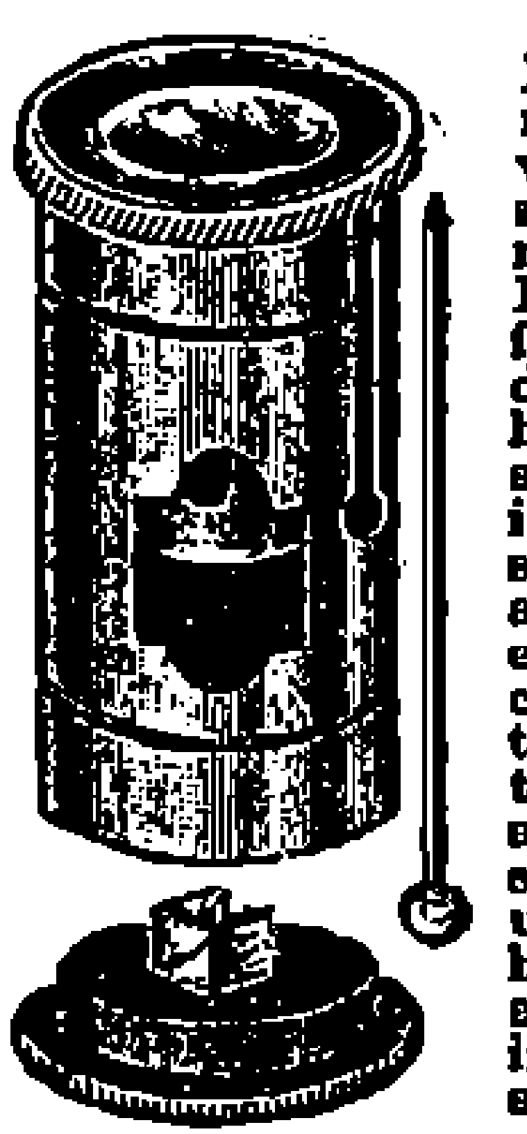
PRICE POSTPAID 35c

MICROSCOPE and FLOROSCOPE

COMBINES ALL THE POWER AND DEFINITION OF THE MORE EXPENSIVE MICROSCOPE

SURPRISINGLY GREAT MAGNIFYING POWER

EXAMINE GERMS IN WATER, CHEESE, SUGAR, ETC.



There are few things so interesting and valuable as a Microscope. It enables you to minutely examine mineral animal and vegetable specimens, to test cotton, wool, silk, seeds, water, flour, cheese, milk, and in fact nearly all articles of food. Unwholesome meat can be readily detected and ferments can be closely watched. It is exceedingly interesting to examine the spores of ferns, soda, sugar, salt, alum and other crystals, the dust (scales) from moth and butterfly wings, human hairs, flies and insects, while the animalculae in water are a never-failing source of wonder. Most interesting experiments can be performed with an instrument such as this. Place a small piece of cheese in a box and allow insects to feed on it for a day or two. Then examine a tiny portion of the cheese under the Microscope and you will see little animals, magnified to the size of large beetles; you can count their legs and the joints in them, the talons or claws upon each foot, also the hair or bristles upon their bodies. Or, obtain some stagnant water; deposit a small portion of scum upon the object glass of the Microscope with a pin's head, and you will see beautiful animalculae swimming about with as much freedom as though they were fish in the boundless ocean. It is a truly wonderful sight and an endless source of interest and enjoyment for everybody. The Microscope is made of brass and is capable of magnifying 160 areas and although small and compact, it will cover a very wide range of microscopic research. **Price only 59c Postpaid. JOHNSON SMITH & CO. Dept. 919 RACINE, WIS.**

TELL YOUR OWN FORTUNE

DREAM BOOK
and
Complete
FORTUNE
TELLER

With the aid of this dream book and fortune-teller. The key to your future. Will you be lucky in love? Successful in business? Will you be wealthy? Complete with dictionary of dreams with descriptions and correct interpretations, with lucky numbers, fortunate days, oracles, divination, palmistry, etc. Also tells how to tell fortunes by various methods, by grounds of coffee or tea, by dominoes, by marks, scars or moles, miscellaneous games with cards, lucky days, weeks, months, years; how to receive oracles by dreams, finger nail observations, etc. **PRICE 10c postpaid.**

FORTUNE TELLING BY CARDS

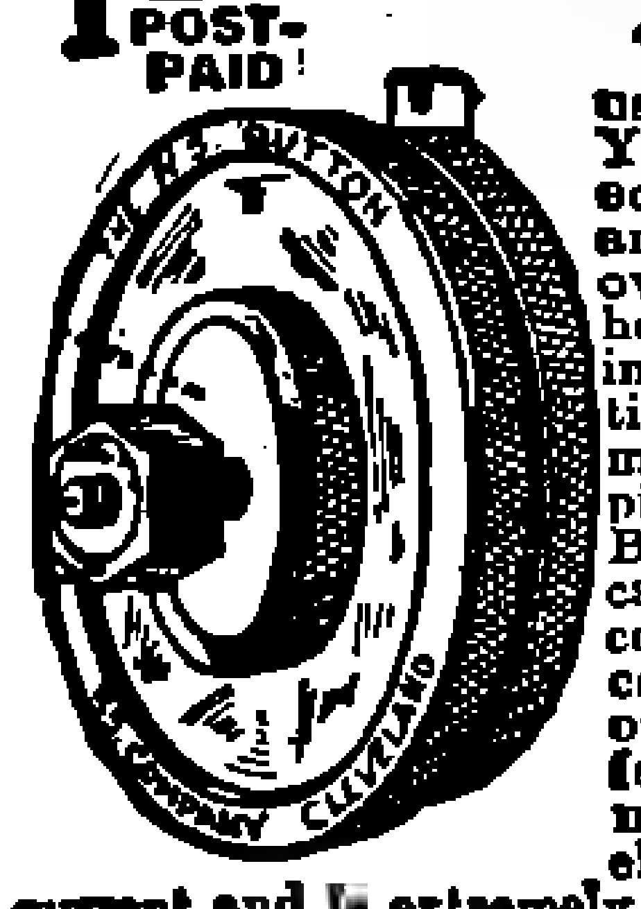
64-page book tells how. Gives the meaning of each and every card, how to deal and lay them out. Everything explained in simple language. **10c postpaid.**

Address orders for all goods on above and on following page to Johnson Smith & Co., Dept. 919, Racine, Wis.

Microphone Transmitter Button

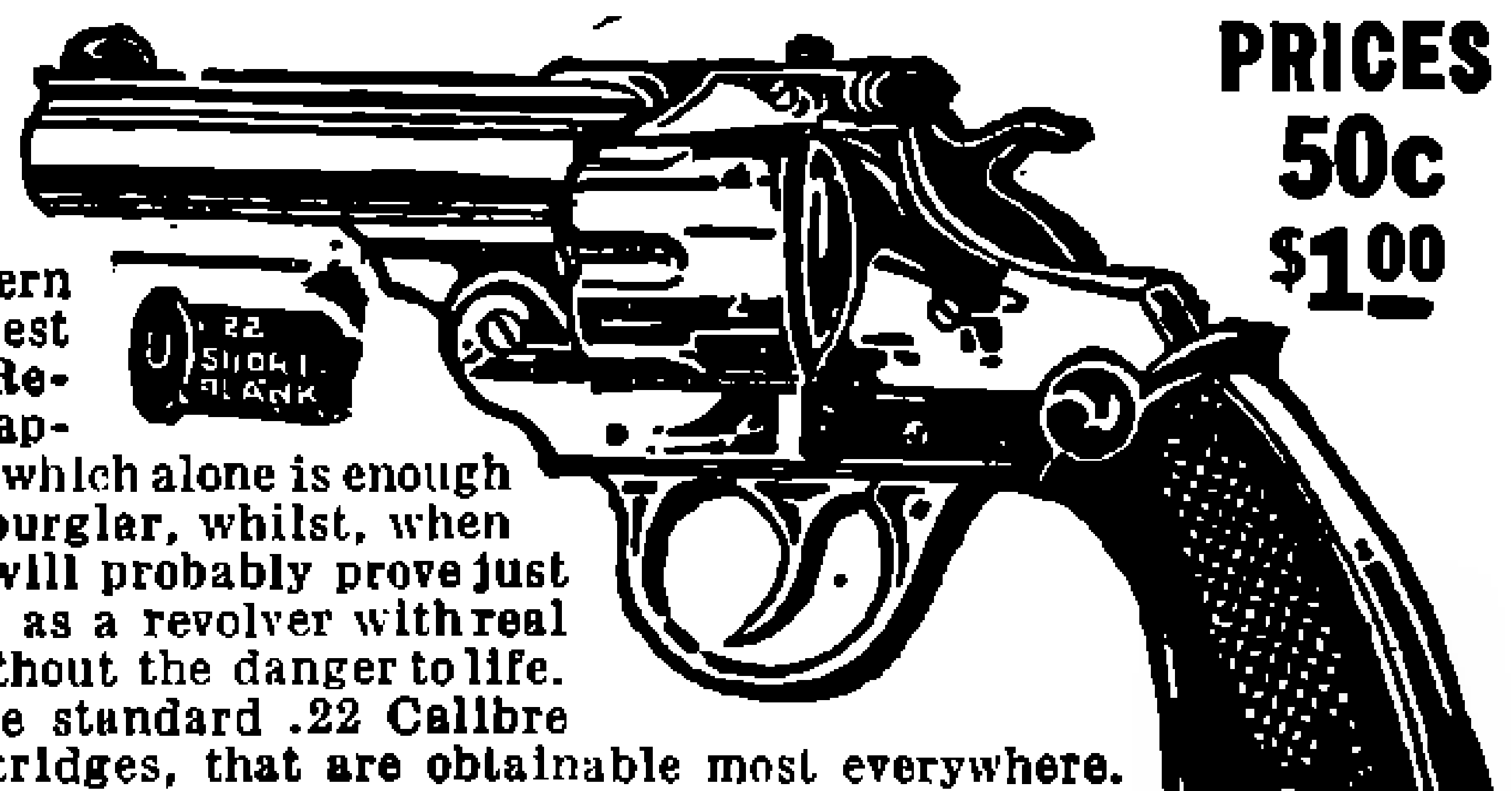
MUSIC AT A DISTANCE
TALKING THROUGH CHEST

$1.00 POST-PAID!



"You can easily make a highly sensitive detectophone by using this Transmitter Button to collect the sound waves. You can build your own outfit without buying expensive equipment. It is simple and inexpensive. You can install an outfit in your home and hear conversations being held all over the house. You can connect up different rooms of a hotel. This outfit was used by secret service operatives during the war. It is being used on the stage. It is ultra-sensitive and is the greatest invention in micro-phones. You can mount the button almost anywhere—card board boxes, stove pipes, stiff calendars, on the wall behind a picture frame, etc. Button is so light and small it cannot be detected. Persons can be overheard without suspecting it. You can listen in on conversations in another room. A deaf person in the audience can hear the speaker. Connected to phonograph, piano or other musical instrument, music can be heard hundreds of feet away. Button may be used to renew telephone transmitters; often makes an old line "talk-up" when nothing else will. The ideal microphone for radio use; carries heavy current and is extremely sensitive. Amplifies radio signals. Countless other similar uses will suggest themselves. Experimenters find the Button useful for hundreds of experiments along the lines of telephones, amplifiers, loud speakers, etc. Many fascinating stunts may be devised, such as holding the button against the throat or chest to reproduce speech without sound waves. $5.00 is given to anyone who sends in a new suggestion for the use of the Button providing the manufacturers find it suitable for use in their literature. **PRICE $1.00 POSTPAID ANYWHERE.**

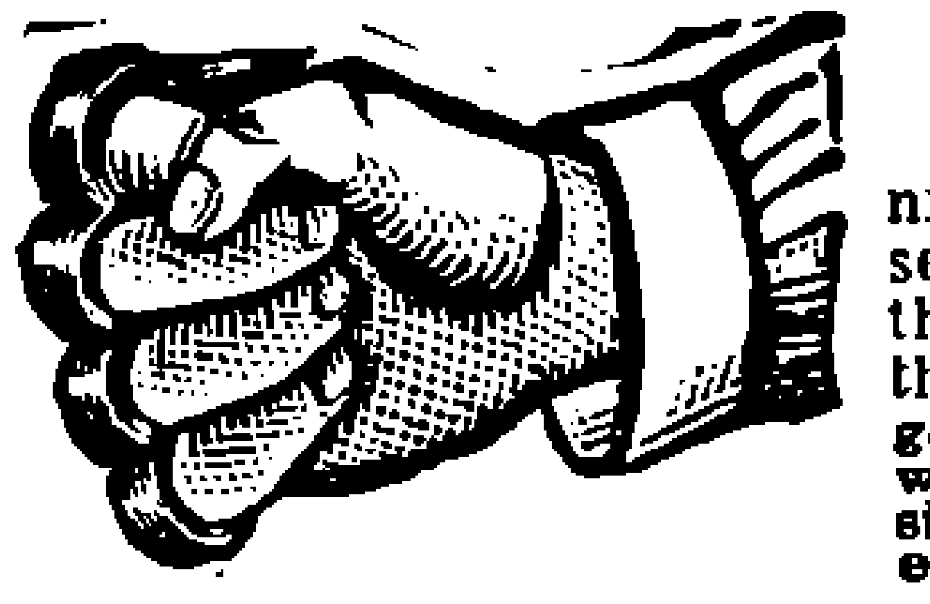
BLANK CARTRIDGE PISTOL



PRICES
50c
$1.00

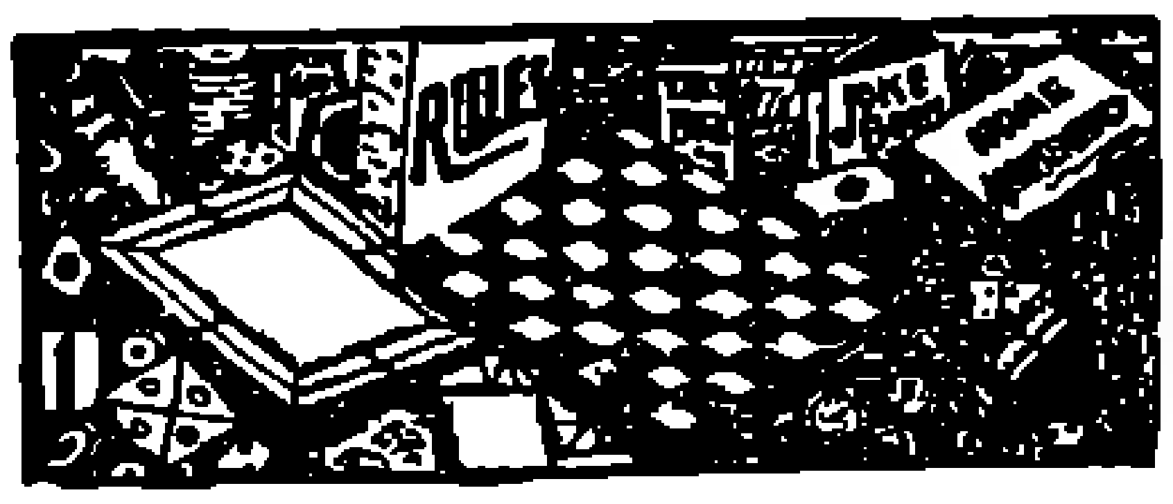
This well made and effective Pistol is modeled on the pattern of the latest type of Revolver, the appearance of which alone is enough to scare a burglar, whilst, when loaded, it will probably prove just as effective as a revolver with real bullets, without the danger to life. It takes the standard .22 Calibre Blank Cartridges, that are obtainable most everywhere. Even the most timid woman can use it with perfect safety and frighten a thief without risk to herself or anyone else. **A Great Protection Against Burglars, Tramps and Dogs.** You can have it lying about without the danger attached to other revolvers. **PRICE ONLY 50 CENTS. Better make and superior quality for $1.00. Blank Cartridges .22 cal., 50c per 100. Cowboy type Holster 50c.** Not prepaid. Shipped Express only.
JOHNSON SMITH & CO., Dept. 919, RACINE, WIS.

SILENT DEFENDER



Used by police officers, detectives, sheriffs, night watchmen and others as a means of self-protection. Very effective. Easily fits the hand, the fingers being grasped in the four holes. Very useful in an emergency. Made of aluminum they are very light, weighing less than two ounces. Handy pocket size always ready for instant use. **Price 25c each, 2 for 45c postpaid.**

BIG ENTERTAINER

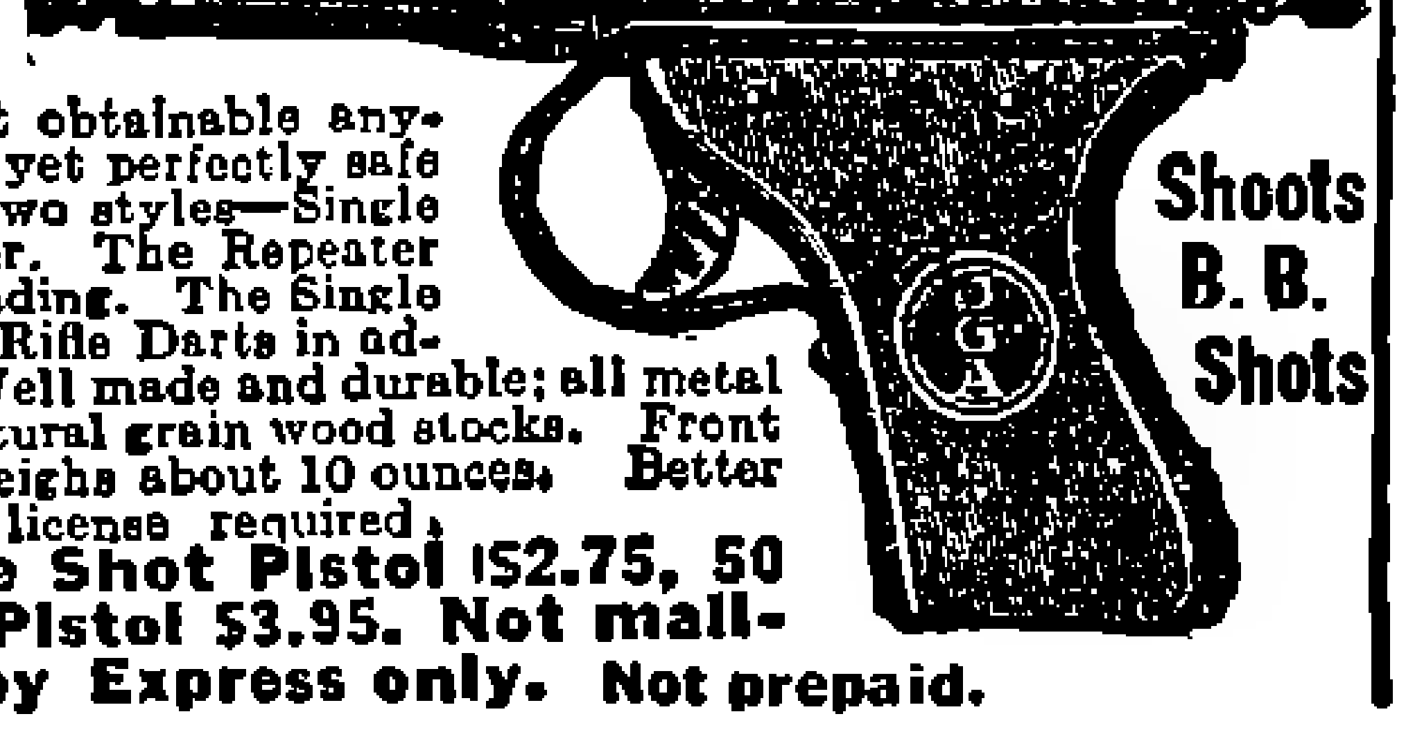


180 Jokes and Riddles, 21 Puzzles and Problems, Gypsy Fortune Teller, 50 Money Making Secrets, 36 Experiments in Magic, 58 Verses in Comic Poetry, 7 Parlor Games, 15 Card Tricks, 10 Funny Readings, 71 Toasts, Cut-outs for Checkers and Chess, Dominoes, Fox and Geese, 9 Men Morris, Anagrams, etc. All for **15c.** Postpaid.

MAKE YOUR OWN RADIO RECEIVER

Enjoy the concerts, baseball games, market reports, latest news, etc. This copyrighted book "EFFICIENT RADIO SETS" shows how to make and operate inexpensive Radio Sets, the materials for which can be purchased for a mere trifle. Also tells how to build a short-wave Receiver for bringing in foreign stations, police calls, ships at sea, etc. **ONLY 15c, postpaid.**

REPEATING AND SINGLE SHOT AIR PISTOLS

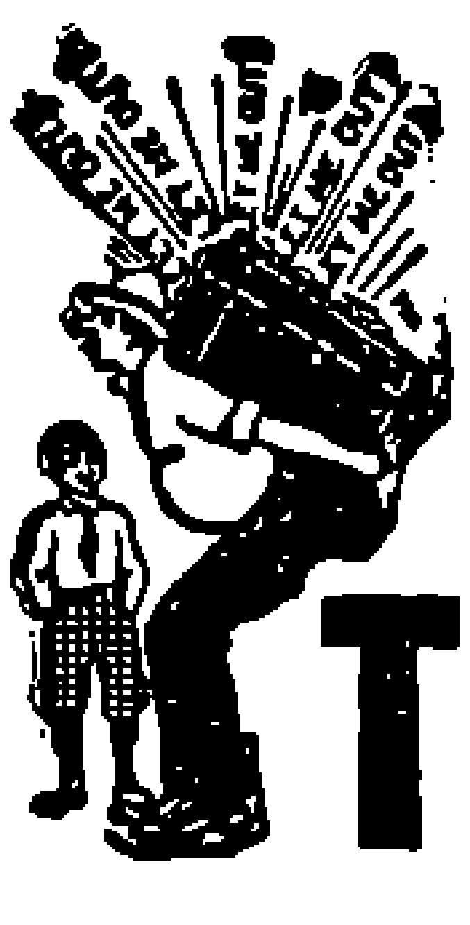


Shoots B. B. Shots

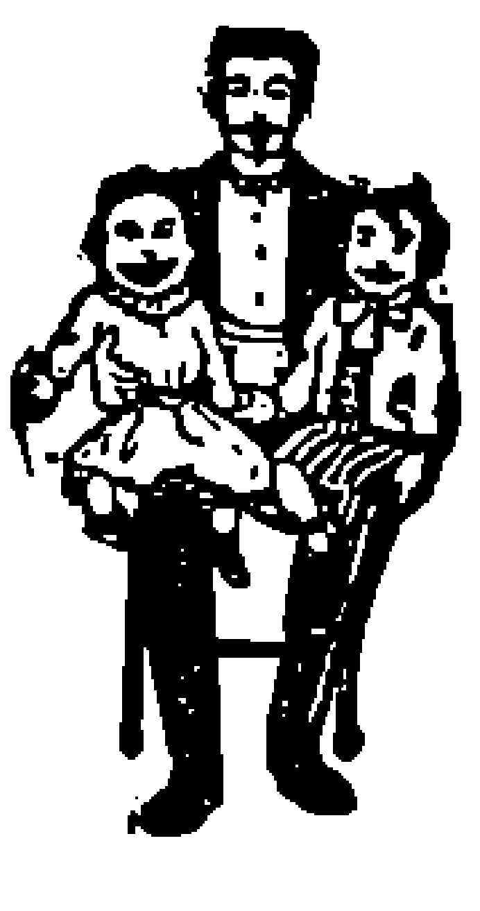
Just what you've always wanted. A powerful high grade Air Pistol, shaped like an Automatic, pocket size. Fires B. B. shot obtainable anywhere. Very powerful yet perfectly safe for boys to handle. Two styles—Single Shot Pistol or Repeater. The Repeater fires 50 shots in one loading. The Single Shot Pistol shoots Air Rifle Darts in addition to B. B. Shot. Well made and durable; all metal parts nickel plated; natural grain wood stocks. Front and rear sights. Weighs about 10 ounces. Better than an air rifle. No license required. **PRICES: Single Shot Pistol $2.75, 50 Shot Repeating Pistol $3.95. Not mailable. Shipped by Express only. Not prepaid.**

BOYS! BOYS! BOYS!

THROW YOUR VOICE



Into a trunk, under the bed, under a table, back of the door, into a desk at school, or anywhere. You get lots of fun fooling the teacher, policemen, peddlers, and surprise and fool all your friends besides.



The Ventrilo

is a little instrument that fits in the mouth out of sight. Cannot be detected. It is used in connection with the above, and with the aid of this wonderful DOUBLE THROAT, or VENTRILO, you can imitate many kinds of birds, animals, etc. Remember you get everything for ONLY TEN CENTS—a booklet giving you full instructions how to become a ventriloquist and throw your voice, the **Double Throat**, or **Ventrilo**, and our big catalog of novelties, tricks, puzzles, masks, books, etc.

All Sent Postpaid to Any Address for Only 10c

MAGICIAN'S BOX OF TRICKS

Apparatus and Directions for a Number of Mysterious Tricks, Enough for an Entire Evening's Entertainment........... $1.00

☛ANYONE CAN DO THEM

It is great fun mystifying your friends. Get this Conjurer's Cabinet, and you will be the cleverest fellow in your district. It contains the apparatus for ten first-class tricks, including The MAGIC BALL AND VASE TRICK (a wooden ball is placed inside, and upon replacing the lid has disappeared and is found in someone else's pocket); The HINDOO TRICK CARDS (can be made to change completely no less than five times); DISAPPEARING COIN BOX (a coin, placed in the wooden box, vanishes entirely or changes into a coin of another denomination); The GLASS GOBLET TRICK (a coin is dropped into a glass of water and when the water is poured out the coin has vanished and is found somewhere else); the RIBBON FACTORY FROM THE MOUTH TRICK (a seemingly endless supply of colored paper ribbons comes out of your mouth); the DISAPPEARING HANDKERCHIEF (a handkerchief held in the hand mysteriously vanishes); the WIZARD'S RING COIN TRICK; the ENCHANTED BOTTLE (no one but yourself is able to make it lay down); the GREAT HAT AND DICE TRICK (a large dice is placed on top of a hat, disappears, and is found underneath yet no one has touched the hat), and last, but not least, the GREAT PHANTOM CARD TRICK, or two from five leaves nothing. Full instructions are sent for performing each trick. In addition to the above, a number of other feats and illusions are fully explained for which you can easily make or procure the necessary apparatus. **Price complete $1.00 postpaid. JOHNSON SMITH & CO.**

BOY ELECTRICIAN

Great Book for Boys, Students, Etc.—Only 10c Postpaid

The HOW and WHY of electricity fully told in simple language that any boy can understand. Scores of plans and instructions for making—dry batteries, dynamos, electric motors, telegraph apparatus, telephones, electric lights, electric door bells, alarms, electric engine, rheostat, mail box alarm, electro-magnets, automatic incandescent flash, electric shocking machine, wireless telegraph apparatus, induction coil, arc light, current reverser, etc., etc. Tells all about electric wiring, static electricity, magnets and magnetism, conductors and insulators, electrostatic induction, the electroscope, the electrophorus, condensers, the Leyden jar, dynamic electricity, the voltaic cell, electromagnets, electrolysis, electro-plating, electrotyping, etc. Also tells how to build a radio receiving set for a few cents. Nearly 100 illustrations. Sent postpaid to any address on receipt of ONLY 10c, coin or stamps.

MAGIC MADE EASY

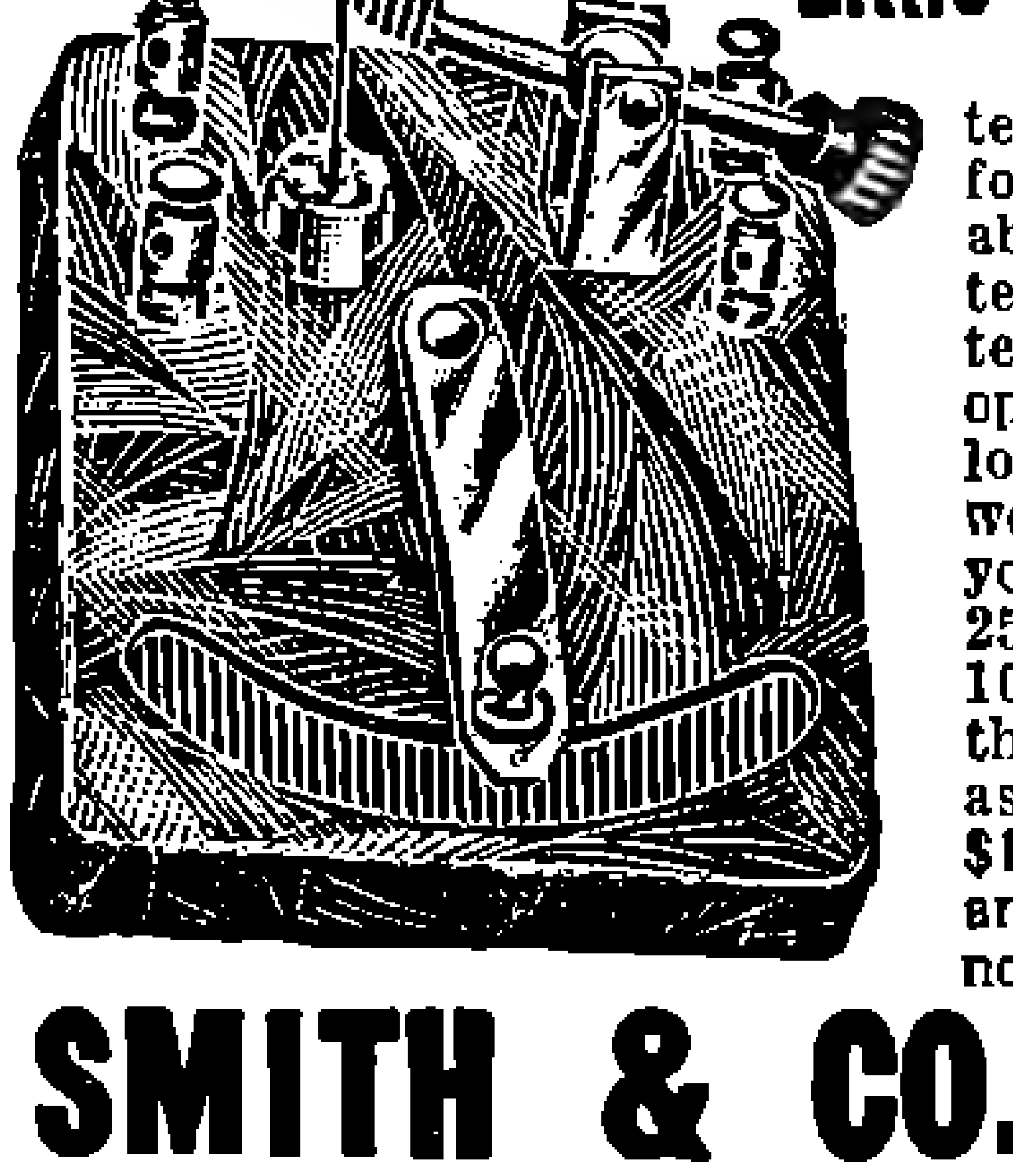
250 MAGIC TRICKS 10c

For Parlor or Stage

An excellent little book containing nearly 300 Tricks for parlor or stage. Tricks with cards, coins, handkerchiefs, eggs, rings, glasses, flowers, thimbles, spoons, bottles, string. Explains the mystery of the floating head and scores of other amazing feats of magic and illusions. Also Second Sight, Shadowgraphy, etc. So simple a child can perform them. Profusely illustrated. **ONLY 10c.**

125 CARD TRICKS and sleight of hand. Contains all the latest and best card tricks as performed by celebrated magicians, with exposure of card tricks used by professional gamblers. **Price 25c**

Little Wonder Crystal Radio Receiver $1



Say what you will about Electrical and Battery Sets, a CRYSTAL set has them all beat for simplicity and clearness of tone. There is absolutely no noise and no distortion—no batteries to buy—no tubes to wear out—no maintenance expense whatsoever. Cost nothing to operate and will last indefinitely. Reception is loud and clear. This Receiver is guaranteed to work equal to the most expensive Crystal Set you can buy. Has a receiving radius of over 25 miles, or under favorable conditions up to 100 miles. Constructed of the finest materials throughout, including supersensitive crystal, assuring quick results. PRICE of Receiver only **$1.00 postpaid.** Or complete with Ear Phone and Aerial Kit—everything all complete—nothing more to buy, **$2.95 postpaid.**

Send remittance (Postage Stamps accepted) for all articles listed above, also in our other ad on previous page

JOHNSON SMITH & CO. Dept. 919 Racine, Wis.

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Rates for classified ads, 15c per word per insertion, or 12c per word per insertion for six insertions. Minimum 10 words. Cash should accompany order. Closing date 20th of third month preceding date of issue. Address Classified Mgr., Modern Mechanix and Inventions, 35 East Wacker Drive, Chicago, Ill.

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SB PROPELLERS give better performance. New Special propeller for Henderson and Heath motors, diameter 5 ft. Hardwood only, $18.00 each. Send stamp for new propeller circular and prices on other sizes. Sensenich Brothers, Lititz, Pa.

BUILD Corben Baby Ace, complete kits including factory welded fuselage, tail unit, under carriage. Folder, dime. Corben Sportplane Co., Madison, Wis.

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BE PREPARED in aviation for the next boom. Write for new home study tuition offer. Major Robert Rockwell, Dayton, Ohio.

USED Airplanes, $50 and up. Catalog 10c. Federal Equipment Co., Deerpark, Ohio.

ICEBOAT Propellers—Harley, Henderson, Fords, etc., $6.00, up. Iceboat $18. Lightplane $115.00; pictures 5c.—Edw. Schille, West Bend, Wis.

A NEW Book on Motorless Flying. A B C of Gliding and Sail Flying, by Major Victor W. Pagé. This book has been prepared to meet the demand for a simple, practical and inexpensive treatise on modern Gliding and the data has been carefully collated and prepared with special reference to the needs of young people and beginners in aviation. The leading types of Gliders and sailplanes and their construction, control and launching are described. Instructions are given for forming a glider club and for building a strong yet simple primary glider, including working drawings. 200 (6x9) pages. 72 illustrations. Cloth. Price, $2.00. Modern Mechanix and Inventions, 529 South Seventh St., Minneapolis, Minn.

BIRDMAN Wings, aviation's newest sport, full details how to build, theory and practice $1.00. Lay, Blueash, O.

PROPELLERS Repaired at reasonable prices. Write us fully extent of damage. Free advice. Expert work. Lorenzen Propellers, Niles, Mich.

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ADVERTISING! 20 words, 50 magazines. 60 cts. Three insertions $1.20. Nacogdoches Advertising Agency, Nacogdoches, Texas.

AGENTS

BIG MONEY and Fast Sales. Every owner buys Gold Initials for his auto. You charge $1.50; make $1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 11, East Orange, N. J.

MEN WITH CARS to handle Home Service Branches of new kind "Chain Store" System. Supply steady customers on regular route. Must be satisfied to make $27.50 a week at start. Write Albert Mills, 3700 Monmouth, Cincinnati, O.

MAKE your own products. Employ Agents yourself. Toilet articles, soaps, extracts. We furnish everything. Valuable book Free. National Scientific Laboratories, 1964 Broad, Richmond, Va.

FREE Booklet describes 87 plans for making $20-$100 weekly in home or office business of your own. Elite Co., 214-G, Grand St., N. Y.

BIG Money Applying Gold Initials on automobiles. Easiest thing today. No experience needed. $1.45 profit every $1.50 job. Free samples. "Ralco", B1084 Washington, Boston, Mass.

FREE Literature describing many money-making plans. D-Belfort, 4042 N. Keeler, Chicago.

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YOU ARE wanted to resilver mirrors at home. Profitable business plating auto parts, tableware, etc. Write Sprinkle, Plater, 850 Marion, Indiana.

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(Continued on page 28)

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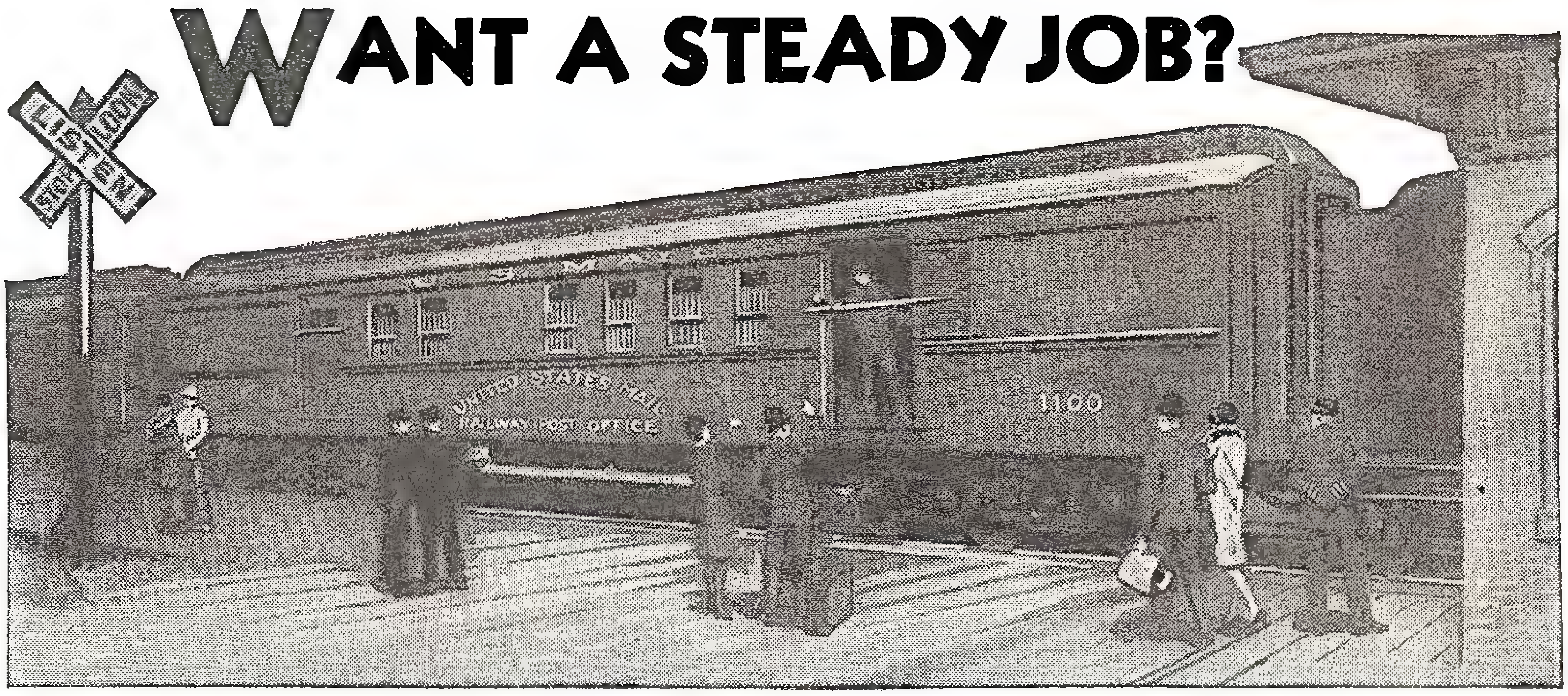

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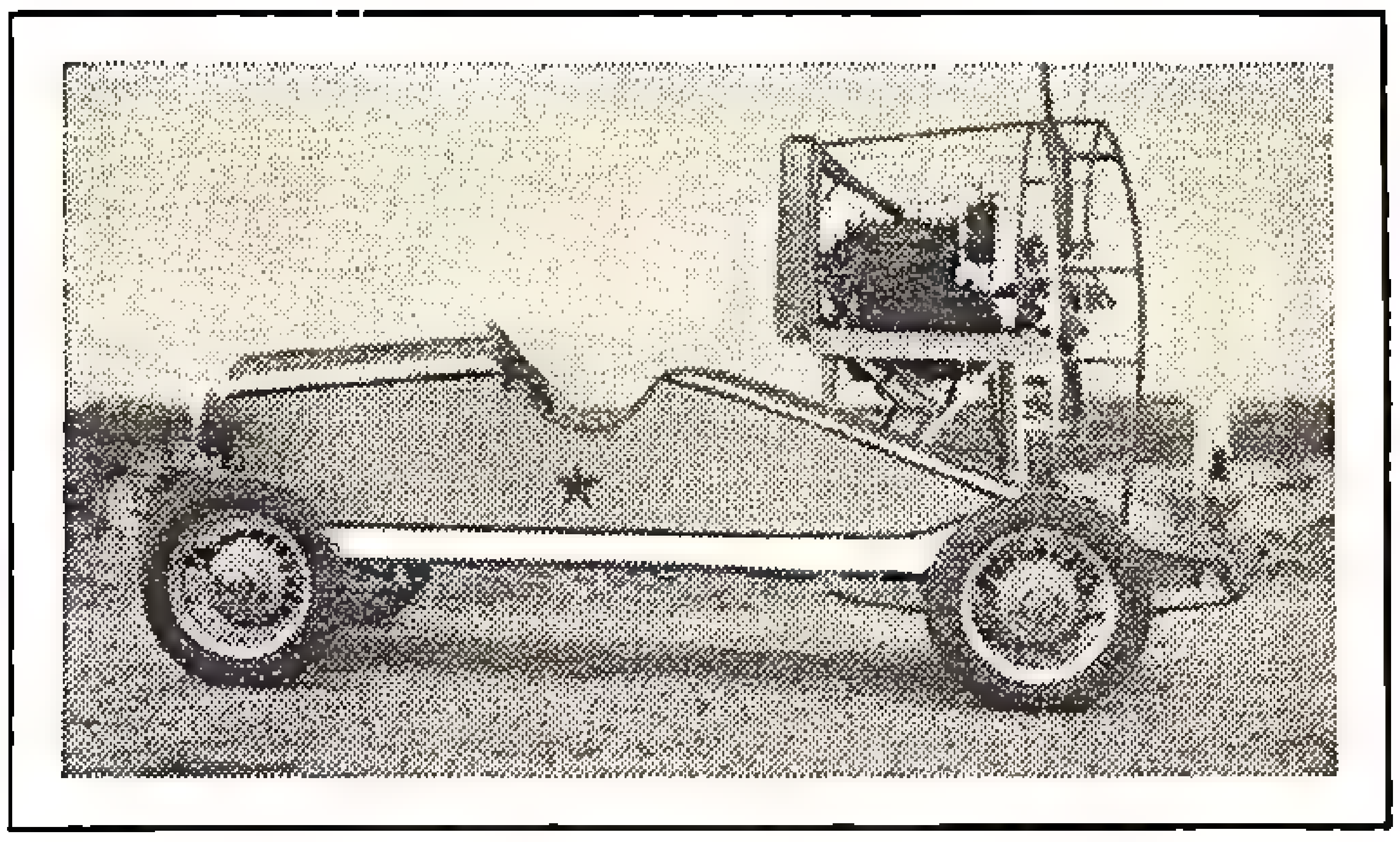
(Continued from page 20)



Jack McMath, of Cape Charles, Va., built this wind wagon out of an old Chev. She wheels free!

power per pound of weight than the gasoline engine, thereby removing the bogey of weight and adding efficient power development to the other qualifications of the Diesel, economy in fuel, safety from fire, elimination of radio interference and reliability.

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See pix on opening page.

* * *

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>
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>
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>
> First of most importance is that we are Incorporated. Next it is a closed corp. no stock being for sale, next comes the fact that the owners of the stock are those of the gang that joined when we organized and stayed with us so this is one Corporation that consists of just common plugs that are trying to do what all the gang wants to see done. That is to get a GOOD plane approved that the gang of common people can build at home and get that (NC) license on it.
>
> Are we doing it? You bet we are and by the first of the year Our Naba will be approved and flying then it will be possible for anyone that has mechanical ability, to build one from approved blueprints and if they build according to those blueprints and be sure and put in good careful workmanship there will be no

(Continued on page 32)

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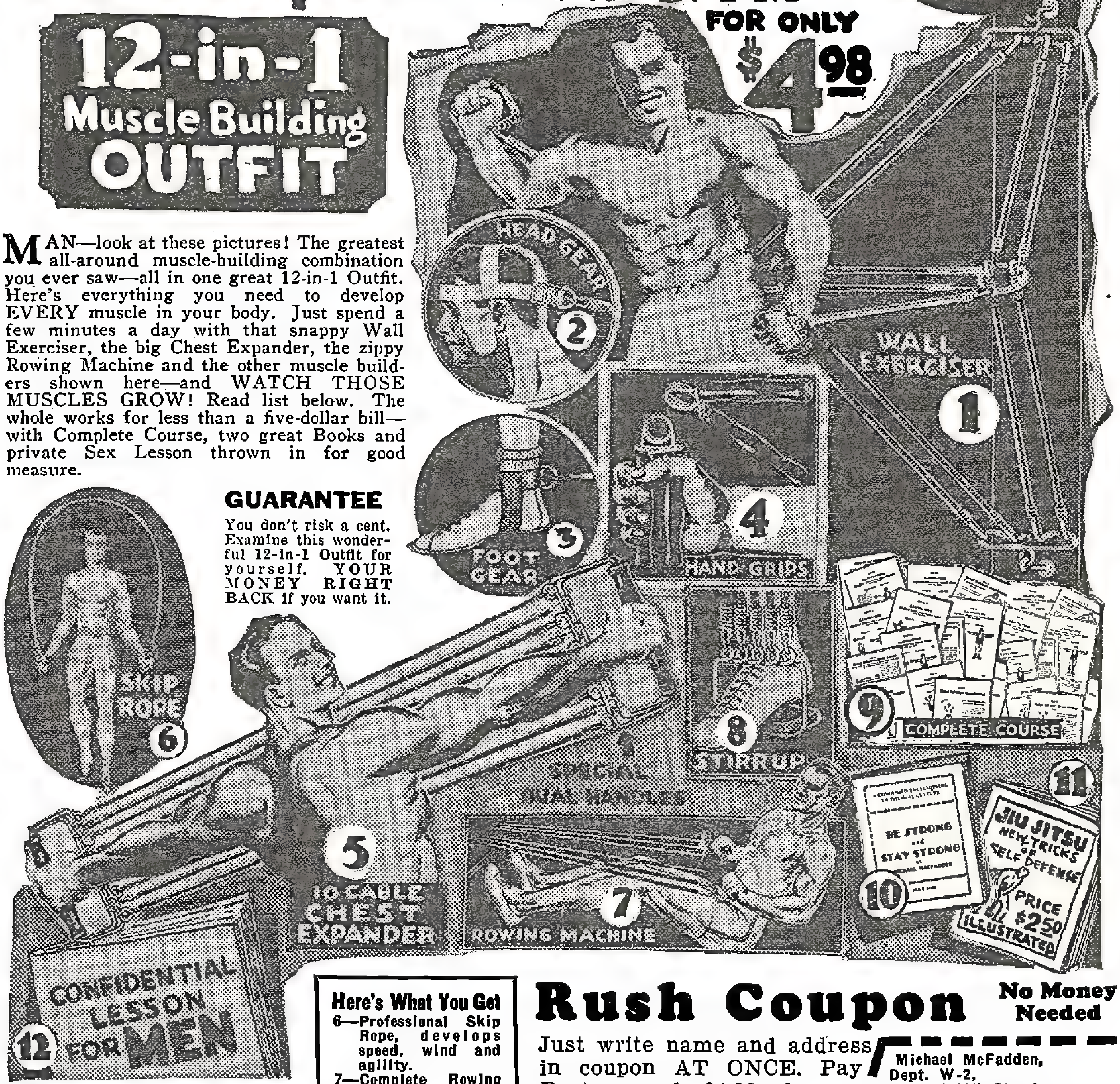
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Aviation is the new field that is rapidly approaching the automotive in Big Pay Jobs for TRAINED MEN. The McSweeny Shop-Plan Method gives you thorough training in Aviation Mechanics. You learn under the practical guidance of experienced instructors. The complete Auto and Aviation Mechanics Course is described in the Big FREE Auto Book. MAIL THE COUPON TODAY.

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Dear Mac: Please forward me your catalog. I want it to add to my traveling souvenirs. I am working in a modern garage although I have been out of school only four weeks, thanks to McSweeny Training. My best regards to all.—M. Klushauk.

Dear Mac: Just a few lines which might interest you. I left your school two years ago last May. Since I left I have not seen a day I could call "hard times". I have been working ever since I left and have averaged in my earnings $173.00 a month, in spite of the hard times. Many thanks. Thos. J. Sharp.

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Town..................State..................

ANDY'S SHOP MAIL BOX

(Continued from page 30)

argument about getting the ship licensed. And let me say right here that a man does not have to be a (LICENSED) mechanic either to build his own plane because the writer is not and has built more than one plane and got them licensed.

Speaking of real blueprints that are simple to read and are detailed to the last nut, bolt and screw. Well, this set is the most complete ever offered the public and there is 150 square feet of them or enough to cover a wall 10 ft. high and 15 ft. long divided into about 60 different drawings so it's very plain to see there must be something detailed about them. They will sell for about $20.00 per set and what a plane they represent.

Some of the gang saw a picture in a March issue of M.M. of the experimental Naba. Well, it was a pretty snappy old rig and flew all over the coast states, but the new Naba is so much better and more beautiful and refined that the old one is out of the picture.

That three wheel landing gear has been perfected so much that a girl and two men soloed the plane in two hours, average. These people never had the controls of a plane in their hands before.

Here are some of the features of Naba. Three wheel landing gear with brakes. Dual WHEEL control. Cross Country Twin Motor. Shoulder high cockpit. It will not ground loop. It cannot nose over. Will taxi tail wind or side wind. Can be moved on ground by a child. No need to lift the tail or use a dolley. The largest plane in the light plane field.

Now listen, gang, we are not ready to release all the blueprints yet, but if you want to start the ribs, etc., drop a line and you will get the dope, BUT inclose a stamp or we will not answer, as we have plenty expense as it is and just because we are incorporlated is no sign we can spend money yet because remember, we are just one of the GANG.

We will have our first advertising in the January or February magazines.

National Aircraft Builders Assn., Inc.
By Alvia Peters, President.

* * *

A breezy letter accompanied by some doubtful pix next comes off the spindle:

Columbiana, Ohio.

To Andy the Grease Monk:
(Or is it greasy monk; or mug?)
Dear ?? Andy:

I am peeved and I don't mean maybe. I have written a letter to you once before and also one to Douglas Rolfe and have not even received an answer to my questions, so I'm peeved.

However, I will try this once more because I think some of the gang might be interested in the snaps I am enclosing in this letter. If you think the gang would get any good out of them why publish them but send the snaps back in the stamped envelope I am enclosing.

The pix are of a Model T conversion I built out of scrap pieces at a cost liberally estimated at some less than twenty-five simoleons. I think

(Continued on page 34)

THE 1933 FLYING MANUAL

is now ready for you!

Crammed with plans for light monoplanes, seaplanes, aviation motors, and countless other items of vital interest to the light airplane enthusiast. Here's a sample of some of the high spots in the Edition:

PIETENPOL SKY SCOUT—Plans for this one-place monoplane powered by Model T Ford motor.

CORBEN CABIN MONOPLANE—Also shown as open cockpit job. Cabin plane costs only $220 for materials, less motor!

HICKMAN BABY SEAPLANE—A one-place twin-pontoon biplane seaplane.

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If your news dealer cannot supply you, send 50 cents to Fawcett Publications, Inc., 529 S. Seventh St., Minneapolis, Minn., and a copy of the 1933 Flying Manual will be mailed to you at once.

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Back issues of the Mechanical Package Magazine, the famous publication for real mechanics interested in building boats, engines, light airplanes and countless other items, are still available from the publishers. Contents of these issues are listed below:

NO. 1 Contains construction kit for building an electric motor—Self-launching trailer for boats—Plans for 60 m.p.h. aero ice sled—Electric model boat—Model 1/4 h.p. gasoline engine "Mighty Atom"—Speed boat plans.

NO. 2 Contains construction kit for making telegraph key and sounder—Miniature steam hydroplanes—A 40 h.p. airplane engine; how to build it—Plans for 19 ft. cabin cruiser—Dynamos, kites, models.

NO. 3 Contains complete kit of parts for building a steam engine that really runs—Packmag midget man-carrying seaplane—Model man-carrying tug—Steam engine construction—Baby race car plans—"Buddy" cruiser by Rabl—Storage battery building.

NO. 4 Contains complete race car blueprints in large size (18" x 24")—Model locomotive building dope—Plans for model steam boat—Doane 15½ ft., 40 m.p.h. hydrobout runabout—Short wave converter—Photo electric stuff—Gas engine plans—Model steam engine dope.

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Mechanical Package Magazine

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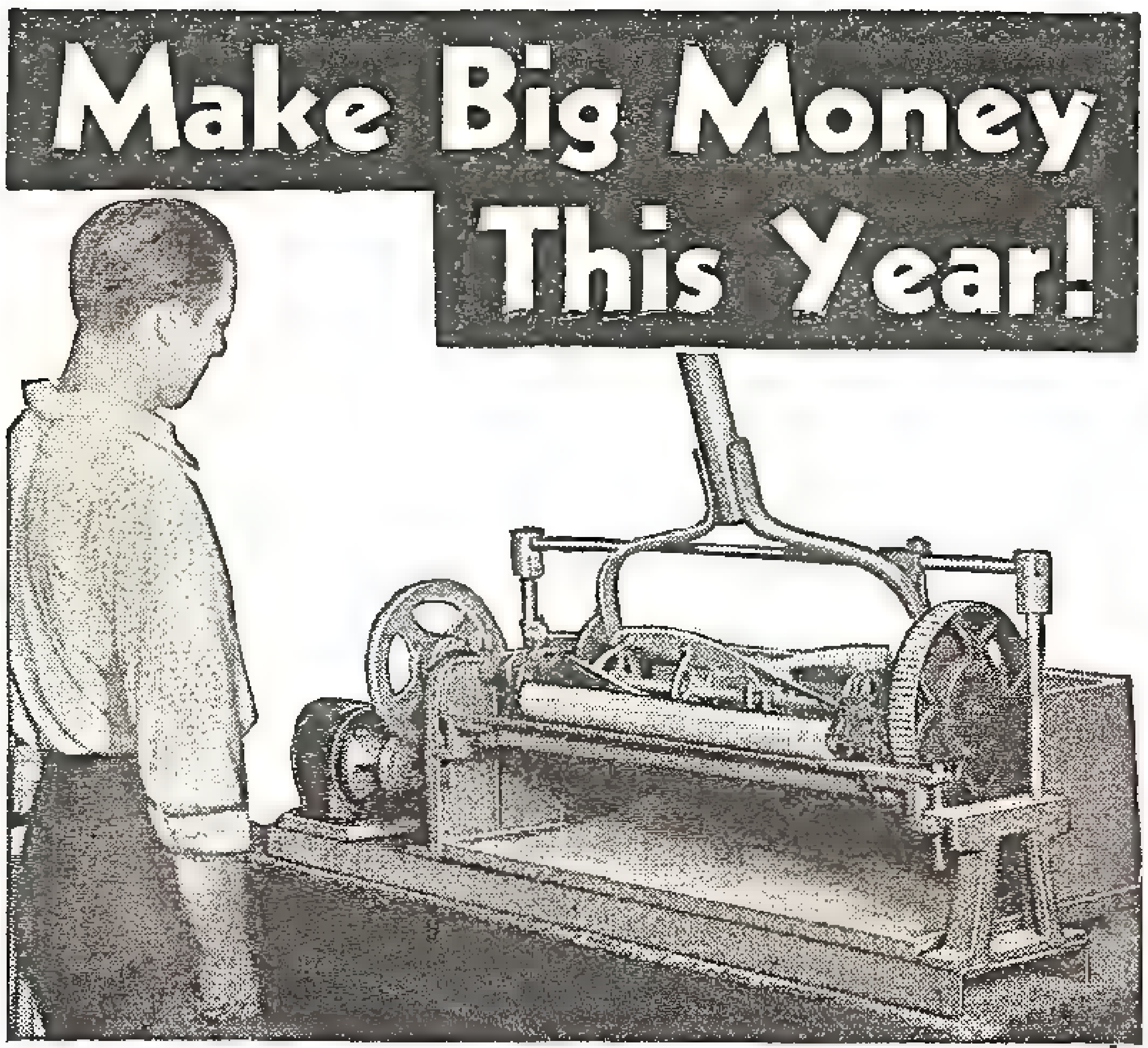

Henry Morse made $1,520 in 5 months. E. J. Hudson made $52.50 more than the cost of his equipment in his first three weeks in business. C. Wanderschied made $300 in 3 months, just in spare time. Many men have made a big success in this business.

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be independent! Here's a business that's all cash . . . no credit risks, no money tied up in stock, no high overhead expense, no canvassing necessary, very small investment in equipment, no experience or training required. Our Free Plan starts you right!

The Foley Electrakeen Lawn Mower Sharpener

is a remarkable machine that sharpens all kinds and sizes of lawn mowers by the same method used by all lawn mower manufacturers. Does a perfect job in from 15 to 20 minutes, sharpening all blades and the cutter bar at the same time. You get $1.00 to $1.50 a job—$3 to $5 an hour. 99c is profit out of every dollar you take in. New attachment also grinds axes, hatchets, knives and all ordinary sharp-edged tools. Sold on easy payments, it quickly pays for itself.

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20	1316	38	794
21	1299	39	769
22	1266	40	741
23	1235	41	709
24	1205	42	685
25	1176	43	658
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I am enclosing $..................which will purchase

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ANDY'S SHOP MAIL BOX

(Continued from page 32)

a great many of the gang are situated like I am; I would like to build an airplane but I have neither the money nor the equipment. I would also like to build a sport roadster like the one in one of the late M.M.'s but even that is out of my reach; so I decided that the cheapest and most practical job would be a Model T.

The frame is lowered seven and one half inches; the front is swung on an angle iron in the manner described by one of the gang about a year ago, as you can see by the snapshot. The rear end is a pair of brackets of my own design, as I did not like the ideas submitted by the mech. who furnished the idea for the front bracket.

The drive shaft is shortened 21" but that was only an experiment on my part and I don't believe it is worth what it costs. That is one thing that can be cut from the cost of the job.

The body is not as nice as I had planned, but it was my first try and when I made a mistake I could not afford to correct it so it went into the job. I found there were a lot of places I had not planned any course of action on and now that I have it done my blunders show up very well indeed. The tail is too stubby and I did not shape my dash to allow for the slant of the cowl; also around the front of the cockpit I should have rolled a small rod into the edge of the sheet metal because when you get into the seat you put your weight on the cowl edge and it puts kinks in the edge.

However, it has its good points; it carries two average sized people and the back of the seat is hinged to permit access to the tool box and gas tank. She holds the road good and the only thing I know about the speed is, I caught and passed a Model A Ford '29 coach after he had a start of the time it took me to turn around in the road. I passed him in less than a half a mile and my car has no speed parts of any kind; just a standard ring gear and pinion and the motor has new rings.

This chassis is a very satisfactory outfit and the underslinging is lower than boughten parts give and the cost won't scare any one. I have been out of work for two years and I ran out of money or I would have had a top and windshield on my buggy. The shield folds down and the top can be put away in the tool box according to my plans. So if any of the gang wants to profit by my mistakes, they can ask me.

Sherril M. Burt.

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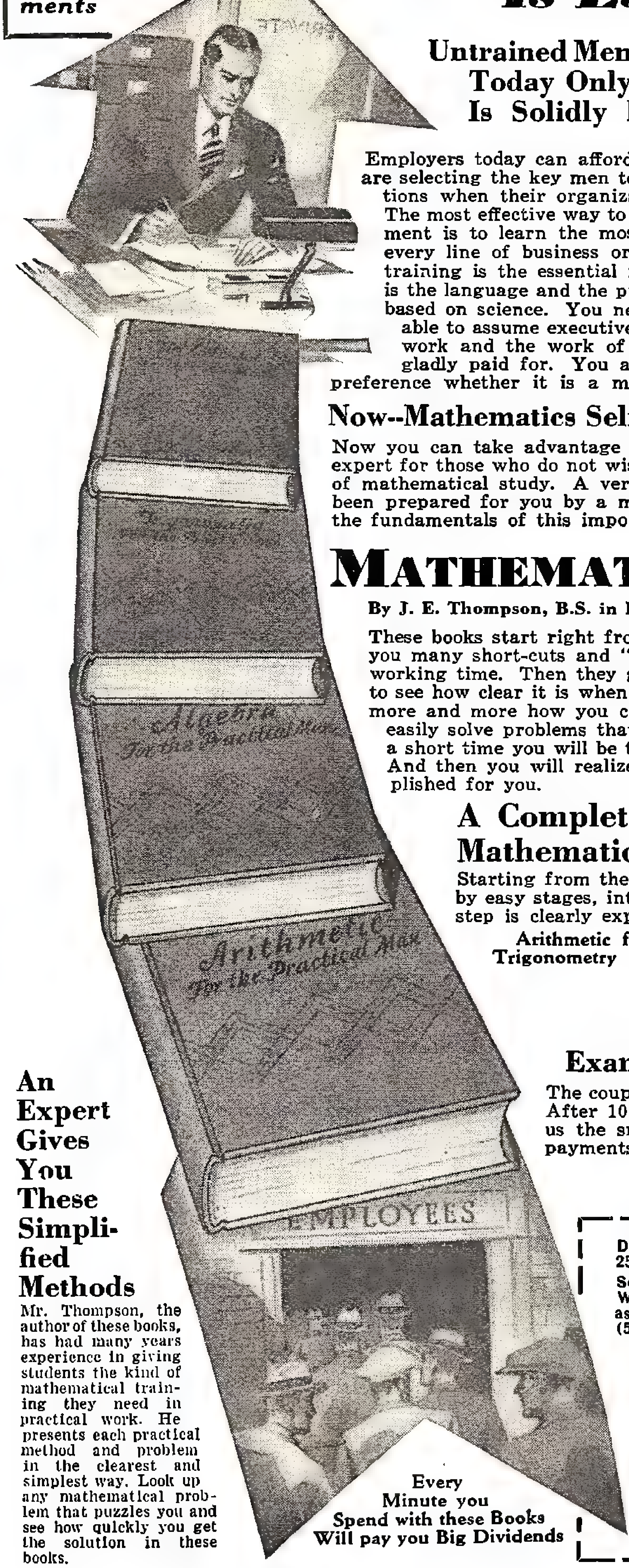

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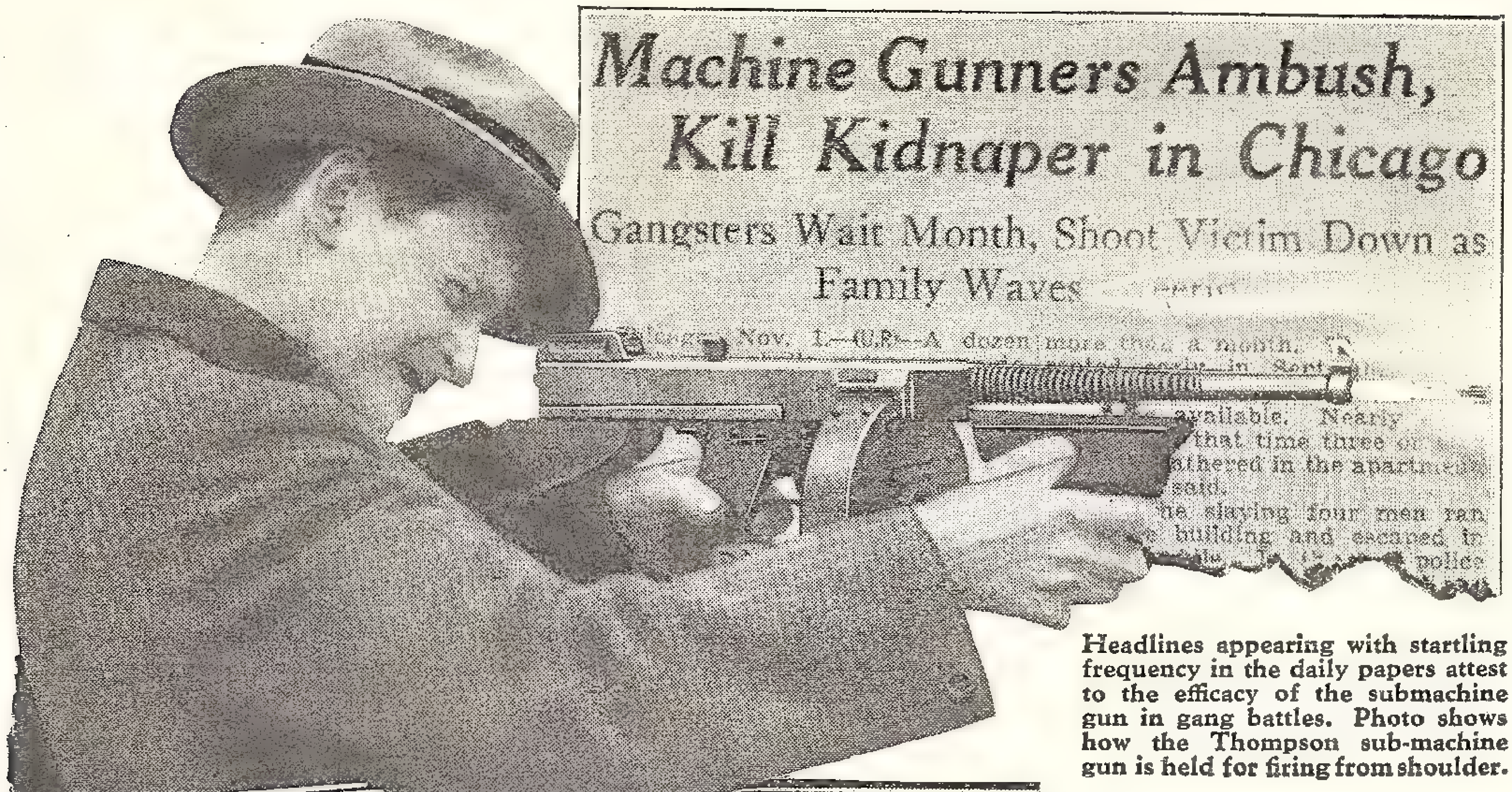
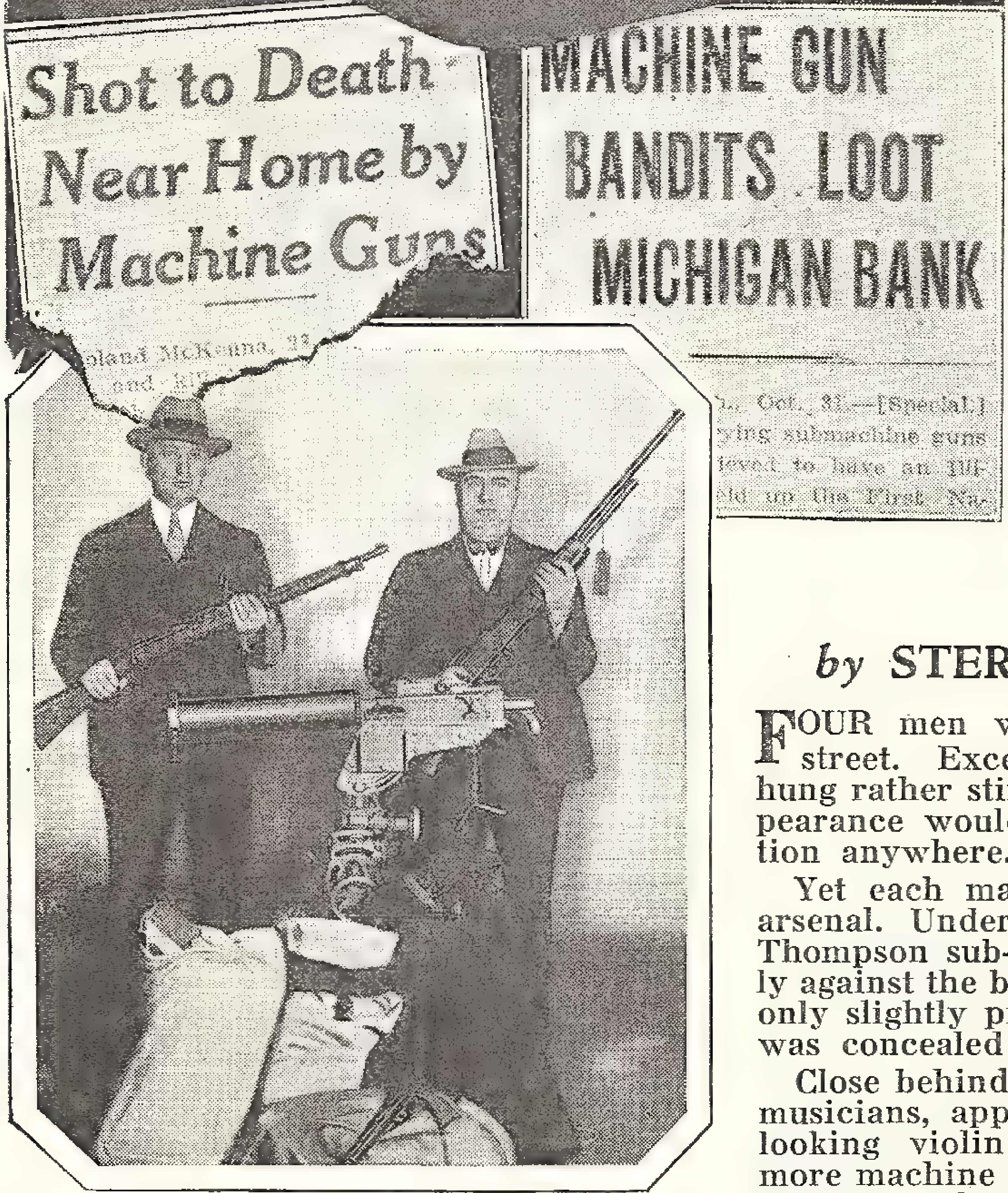


Machine Gunners Ambush, Kill Kidnaper in Chicago

Gangsters Wait Month, Shoot Victim Down as Family Waves

Headlines appearing with startling frequency in the daily papers attest to the efficacy of the submachine gun in gang battles. Photo shows how the Thompson sub-machine gun is held for firing from shoulder.



Shot to Death Near Home by Machine Guns

MACHINE GUN BANDITS LOOT MICHIGAN BANK

Here are two Chicago detectives examining arsenal of gangster's lair. The army type machine gun in the foreground was the principal weapon in the assassination of a couple of rival gangsters who were put "on the spot." Pump gun also makes effective artillery for close-up firing.

If you are an honest, law-abiding citizen, you can't buy a sub-machine gun—but if you're a gangster you'll have no trouble. The author tells here how the underworld carries on an amazing secret traffic in machine guns and other deadly weapons.

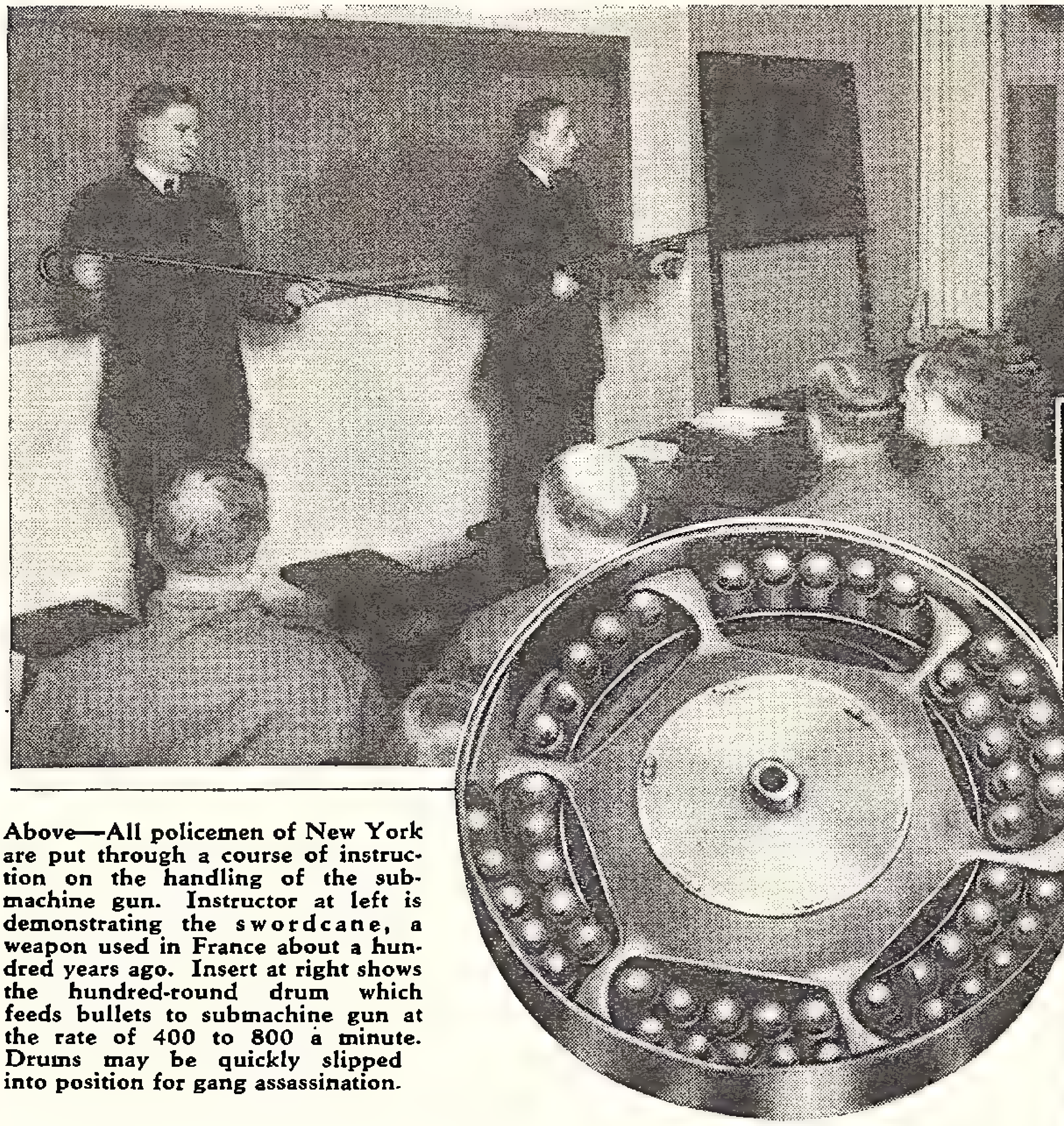
by STERLING GLEASON

FOUR men walked down a busy city street. Except that their right arms hung rather stiffly at their sides, their appearance would have attracted no attention anywhere.

Yet each man was literally a walking arsenal. Under each well-tailored coat, a Thompson sub-machine gun nestled snugly against the bearer's armpit. The muzzle, only slightly protruding beneath his coat, was concealed in the palm of his hand.

Close behind them walked two others—musicians, apparently. But the innocent-looking violin cases they carried held more machine guns. Each carried a round black drum loaded with 100 45-calibre bullets. In an instant these six men could have transformed themselves into a formidable machine gun squad of terrible power.

Gang DEATH MACHINES



Above—All policemen of New York are put through a course of instruction on the handling of the submachine gun. Instructor at left is demonstrating the swordcane, a weapon used in France about a hundred years ago. Insert at right shows the hundred-round drum which feeds bullets to submachine gun at the rate of 400 to 800 a minute. Drums may be quickly slipped into position for gang assassination.

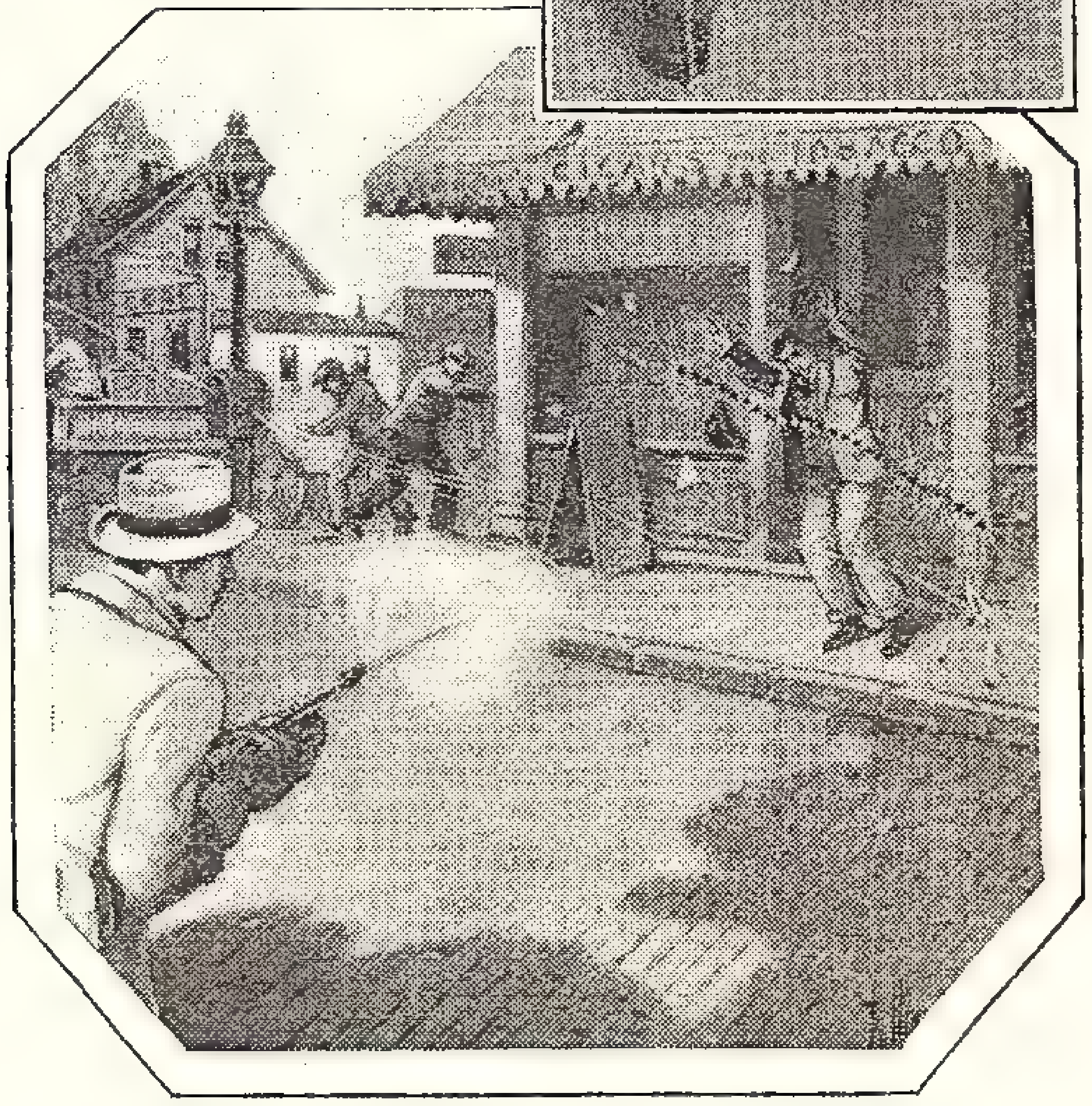
At right is seen foot strap which holds barrel steady in short bursts of firing.

Such a miniature army might today enter your own town and open a reign of terror. An amazing secret traffic in machine guns has armed organized crime in military fashion.

With revolvers and pistols for light arms, machine guns for artillery, armored automobiles for tanks, and tear gas for poison barrage, criminal mobs become more formidable than an army. All this is made possible by underworld channels which distribute the weapons for the sake of an enormous profit.

How do gangsters obtain these terrific instruments of death? Where are they manufactured? How are they distributed and sold? Recently the writer undertook to learn these facts. He found the amazing truth to be that machine guns can be bought like so many sacks of potatoes—if you are known in criminal circles and have the money. An honest citizen might find it difficult to get one—but not a known gangster!

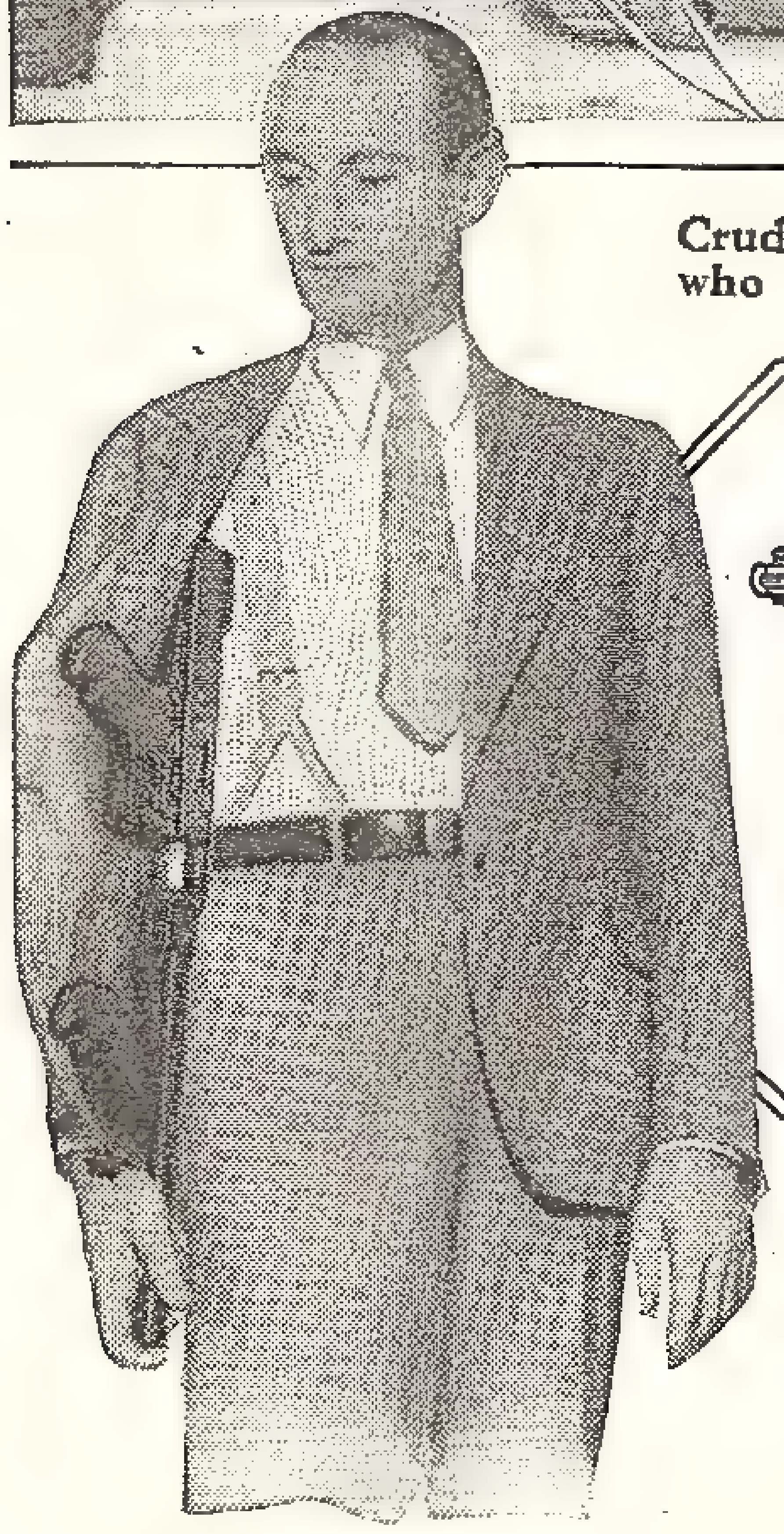
Here is an example of how the system works. A number of sub-machine guns, ordered in the name of the police department of a large city, were diverted by an

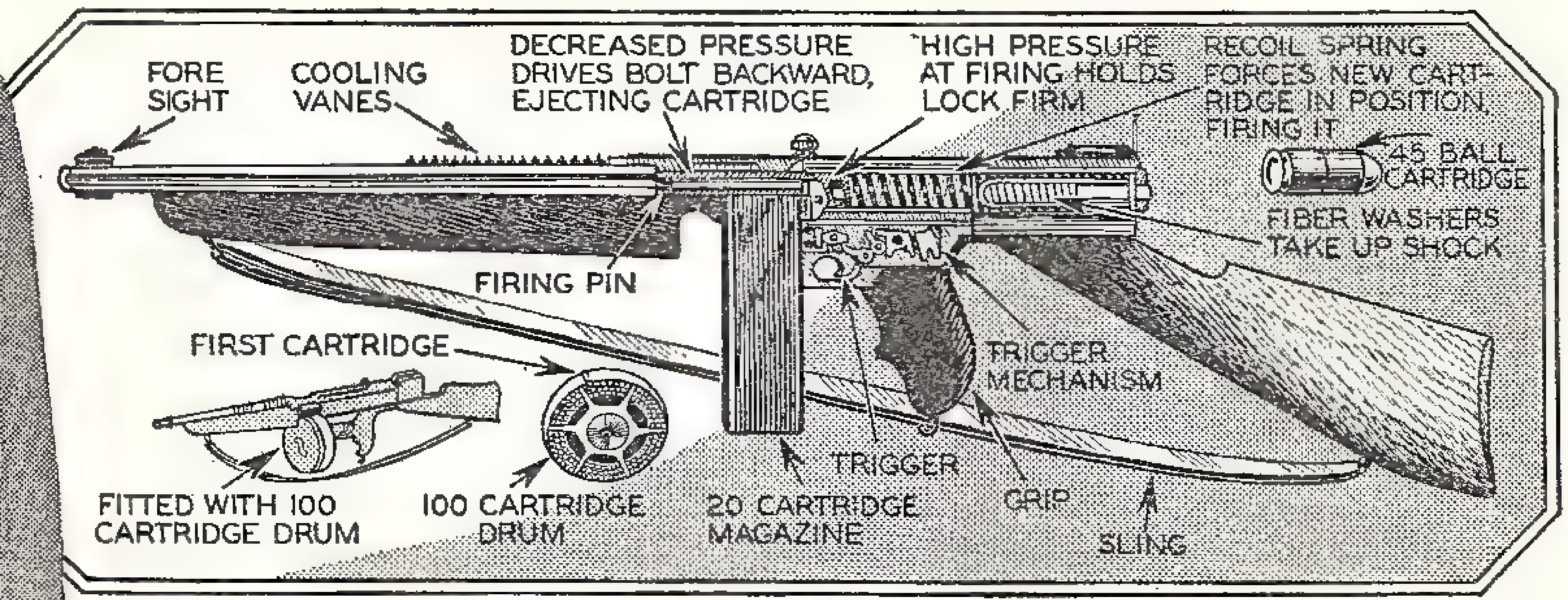


Careful aiming is unnecessary with the submachine gun. Spitting 100 rounds in 15 seconds, the gun needs only to be pointed in the general direction of the victim. The recoil causes the bullets to cut a pattern of holes curving upward.

Pull on Trigger of Submachine Gun Sprays 100 Bullets in Fifteen Seconds

Crudely made but deadly, this "gas pipe bomb" was intended for home of a Chicago gangster who was muscling in on a rival's territory. Police officer is explaining its construction.




FORE SIGHT
COOLING VANES
DECREASED PRESSURE DRIVES BOLT BACKWARD, EJECTING CARTRIDGE
HIGH PRESSURE AT FIRING HOLDS LOCK FIRM
RECOIL SPRING FORCES NEW CARTRIDGE IN POSITION, FIRING IT
.45 BALL CARTRIDGE
FIBER WASHERS TAKE UP SHOCK
FIRING PIN
FIRST CARTRIDGE
TRIGGER MECHANISM
TRIGGER
FITTED WITH 100 CARTRIDGE DRUM
100 CARTRIDGE DRUM
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GRIP
SLING

One of the chief advantages to gangsters of the Thompson submachine gun is that it can be concealed beneath the coat, as illustrated at the left. Drawing above shows the construction of the deadly submachine gun. Operated by recoil of the shots, the gun literally sprays a victim with bullets coming out almost end to end. Cartridges of .45 caliber, almost a half inch in diameter, kill instantly.

unscrupulous official to a firearms company in which he had a financial interest. When detectives checked up, the dealer said that all records had been lost, and that he could tell them nothing. Police did not doubt that the guns had passed into the hands of criminals, but lack of legal proof tied their hands.

This episode was followed by a series of robberies in which machine guns were used. Soon afterwards, a carload of racketeers overtook an armored truck, opened a withering stream of machine gun bullets on the wheels, cut them out, and overturned the truck. When the crew foolishly came out to give battle, they were shot down and a large payroll stolen.

Modern machine guns are of two types —the machine gun, and the sub-machine gun. The machine gun, proper, is a large weapon, weighing, complete, several hundred pounds and requiring a tripod mounting. Its ammunition is generally of .30 calibre, although .45 and .50-calibre guns are in use by the Army. The bullets are fired from belts or drums.

The sub-machine gun is smaller, lighter, and requires no mounting. It is the principal weapon of the racketeer.

Rapid-fire guns today are operated by the recoil of the barrel or the back-pressure of the powder gas. The Vickers, Browning, Maxim, and the Thompson submachine gun, are recoil-operated; the Browning auto-rifle, Hotchkiss, and Lewis machine guns are operated by gas pressure.

Because of its large size and weight, the ordinary machine gun is used almost exclusively by military authorities. Gangsters prefer the Thompson sub-machine gun. If you study this weapon, you will realize what a terrifying thing it is, and understand its power. Short, stocky, light enough for one man to carry and use, it is in reality an automatic rifle which will pour out bullets at the terrific rate of 400

Drucci, Chicago Gang Killer, Used Submachine Gun, Sawed Off Shotgun

to 800 per minute—spitting them forth so fast that they are almost end to end.

The ammunition is .45-calibre—giving the gun greater "stopping power" than any other ordinary machine gun or rifle. The impact of these heavy slugs will inflict a terrible shock that stops the strongest man immediately.

Traveling at from 850 to 900 feet per second, the .45 bullet carries a muzzle-energy of 430 foot-pounds. At 300-foot range, it will penetrate white pine to a depth of 5½ inches. Not only the force its bullets deliver upon impact, but its rapidity of fire, makes the gun so deadly.

A 100-round drum may be fired in less than fifteen seconds. Pump 100 lugs of lead, weighing more than three pounds all together, into the delicate parts of the human body, and you will put any man out of commission.

Accuracy of aim is not a strong point of the sub-machine gun. "It doesn't need to be accurate," one detective told me. "This gun puts out the bullets so fast they almost run over one another. You don't put the gun to your shoulder and aim it, like a rifle. You just hold it at your side, point it in a general direction, and spray the mark with bullets. It's just like using a garden hose. The recoil lifts the muzzle and kicks it to the left, so that the gun cuts a pattern of bullet holes that curves diagonally upward. Nothing could live in that line of fire."

Although a tremendous power in the hands of the gangster, the machine gun is useful to police chiefly as a threat. Ruthless gangsters have no objection to turning a machine gun loose on the street, shooting down women and children without compunction. Such an occurrence has taken place in New York City three times within the past six months.

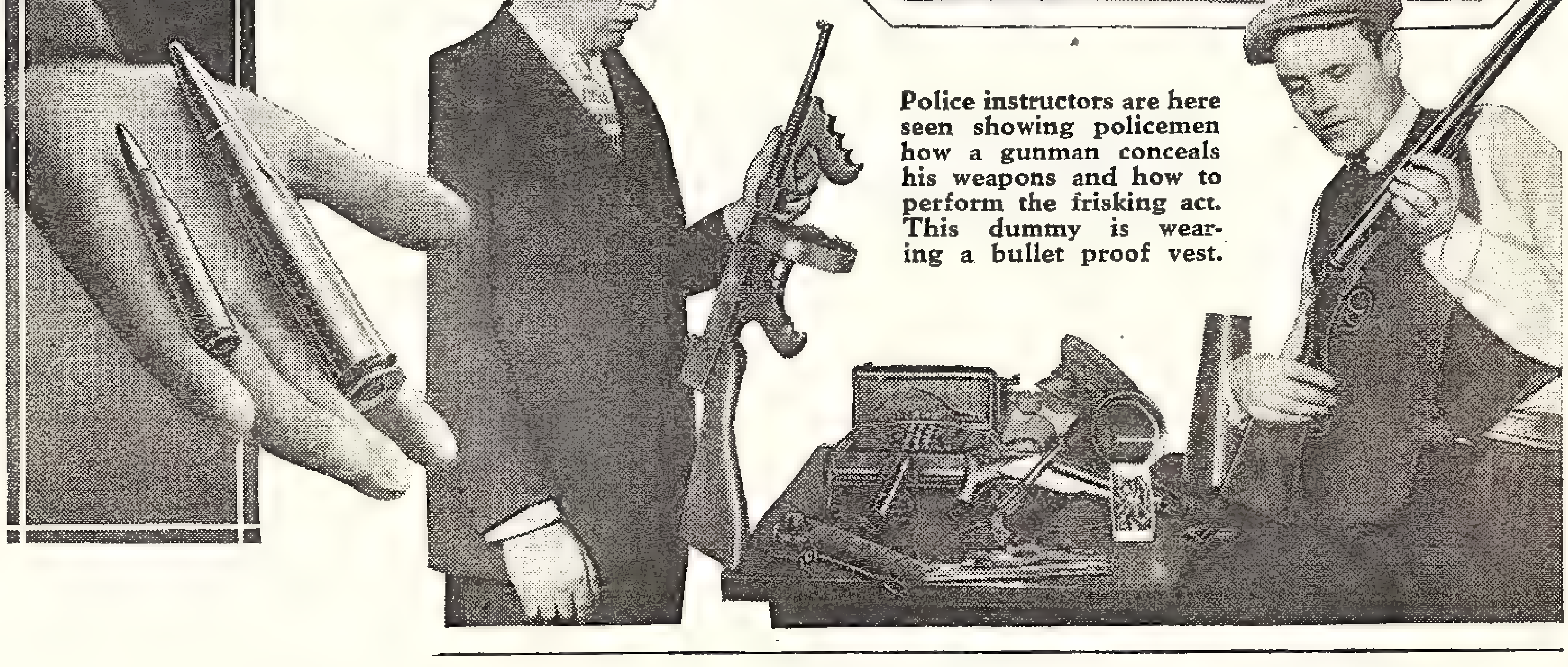
Policemen, however, will not fire into a crowd. Tear-gas is more effective and does not permanently injure. Only when a desperate criminal is barricaded in a house, for example, can the machine gun be used freely by police.

"I have frequently used the sub-machine gun for personal protection," said one detective lieutenant whose work brings him into constant contact with gangsters. "For this purpose, a Thompson gun, plus a tear-gas 'fountain pen,' is ideal.

"Recently I had to bring in a big beer baron who had just come to town and was wanted by police. A known killer, he was always accompanied by a heavily-armed bodyguard.

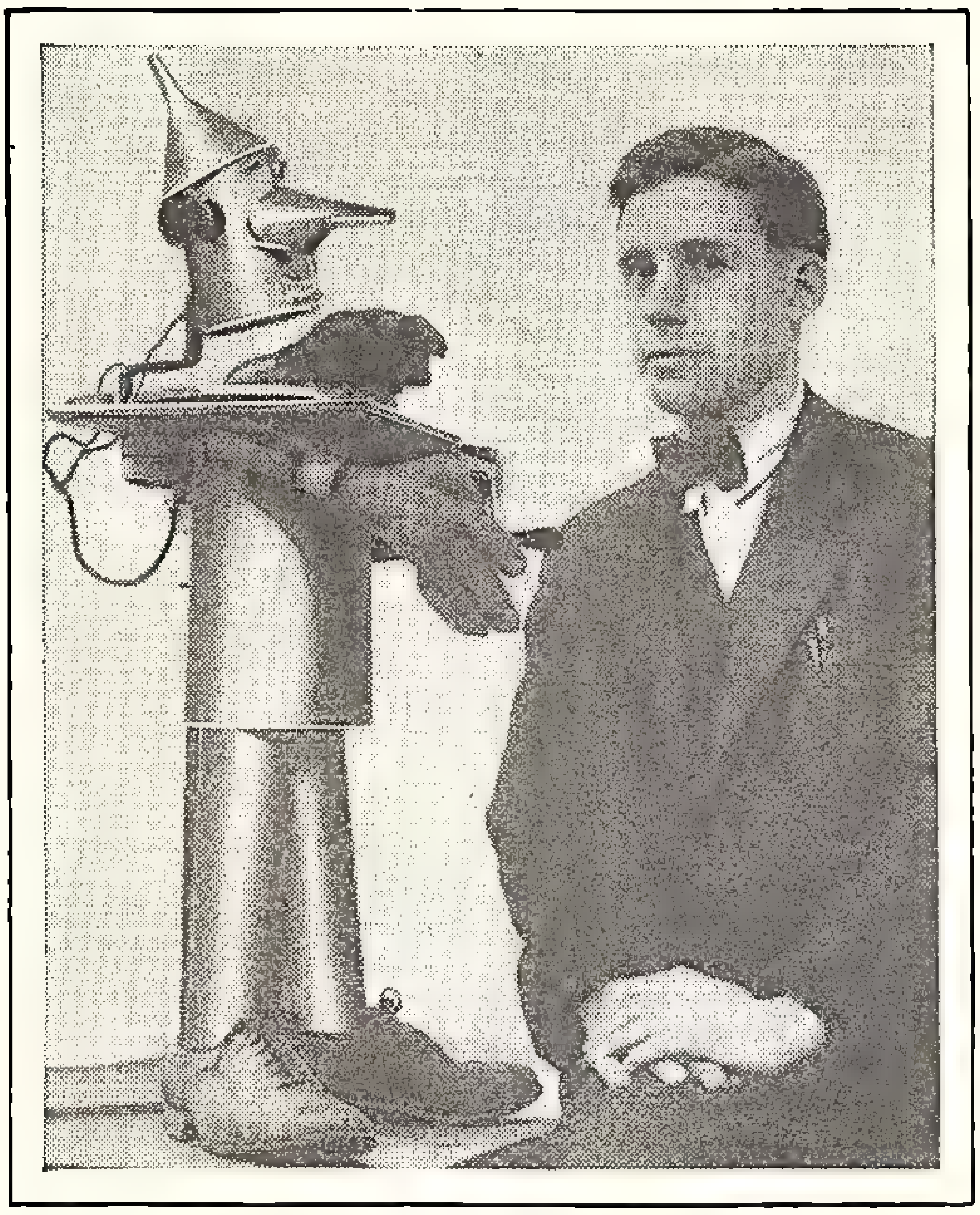
"When I called at his hotel room, I carried the 'typewriter' in my hands. Aiming it straight ahead of me, I kicked the door open. When the beer baron and his bodyguards saw the ugly muzzle of the 'chopper,' they raised their hands skyward in a hurry. No man cares to argue with one of these babies."

Police instructors are here seen showing policemen how a gunman conceals his weapons and how to perform the frisking act. This dummy is wearing a bullet proof vest.



Right—Some of the weapons found in the arsenal of Schemer Drucci, Chicago gangster, famous for his ability as an executioner. The submachine gun and the sawed-off shotgun were his favorite weapons. Left—The .30 and .45 caliber bullets.

Robot Introduces Banquet Speakers and Makes it Snappy



Prof. Beard with the robot which does duty as a speaker at boresome banquets. The robot, speaking from a self-starting phonograph, rattles off the customary introduction.

RECOMMENDED for speakers tired of the general run of chairmen is a new robot speaker created by Prof. William Beard of the California Institute of Technology, at Pasadena.

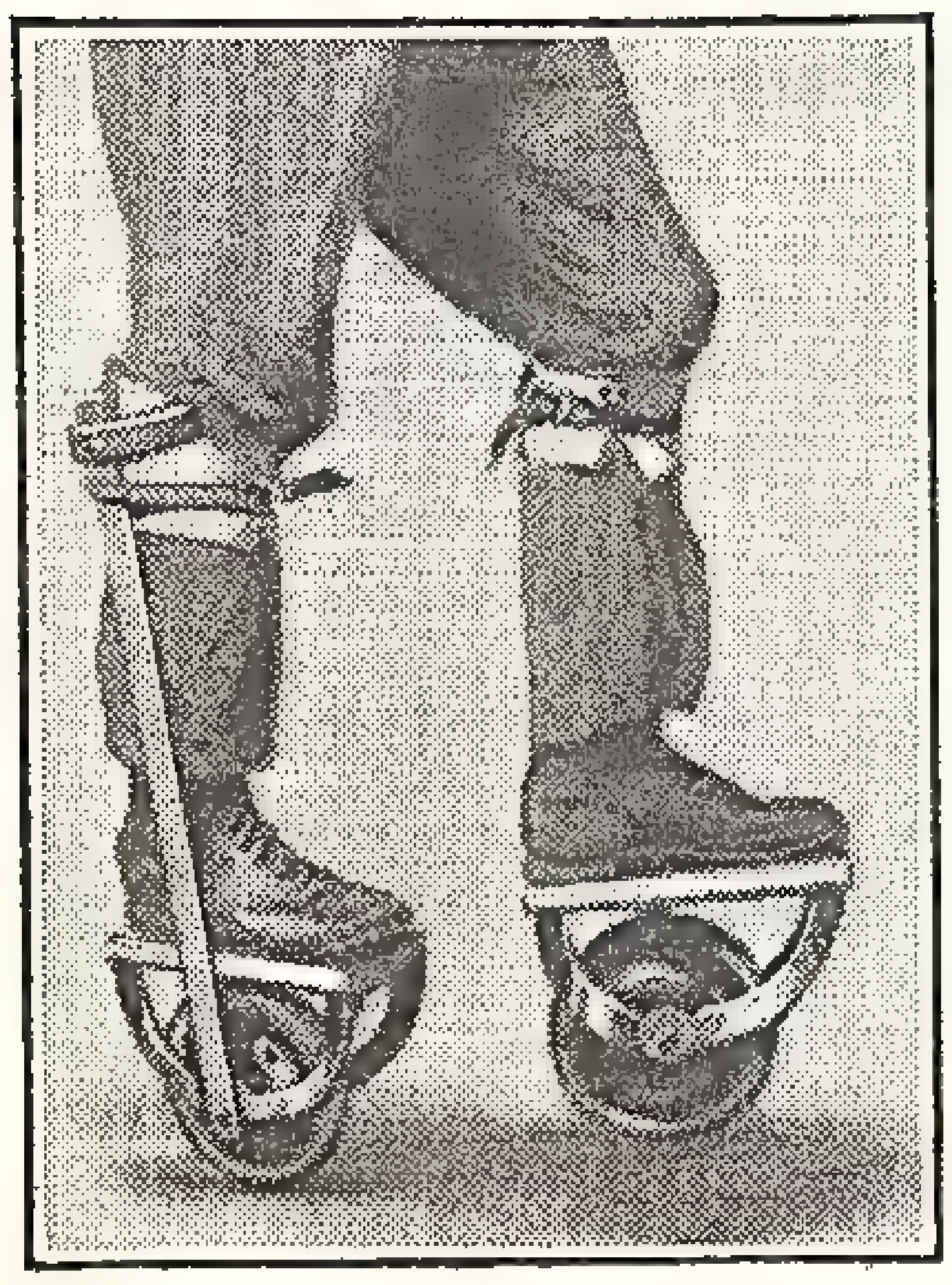
Prof. Beard takes the robot with him to lectures, sets it beside him, and the phonograph within the robot speaks: "Friends and fellow robots, if any. Now I have got to be a chairman and introduce this distinguished gentleman on the right who has a message of importance to give you. Unlike most chairmen, I am not going to talk you to death, but will cut it short. Okay, professor, shoot."

Prof. Beard's robot is made from sheet iron, a coffee pot, toothbrushes for eyebrows, electric lights for eyes, and a self-starting phonograph for a voice.

Know Anybody Acting Like This?

DREAMS and fairy stories as clues to what goes on in the brains of people suffering from the kind of insanity called dementia praecox were described recently by a London mental specialist. One familiar characteristic of dreams is to shift rapidly from one idea or environment to another. The theory propounded is that dreams and fairy stories probably pass continually through the disordered minds of victims of dementia praecox. An individual who went around acting out such fairy stories obviously would be mad, which may be about what happens to the victims of dementia praecox.

Stilt Walker Comes Down to Earth



Something new in skates. These are made from coaster wheels.

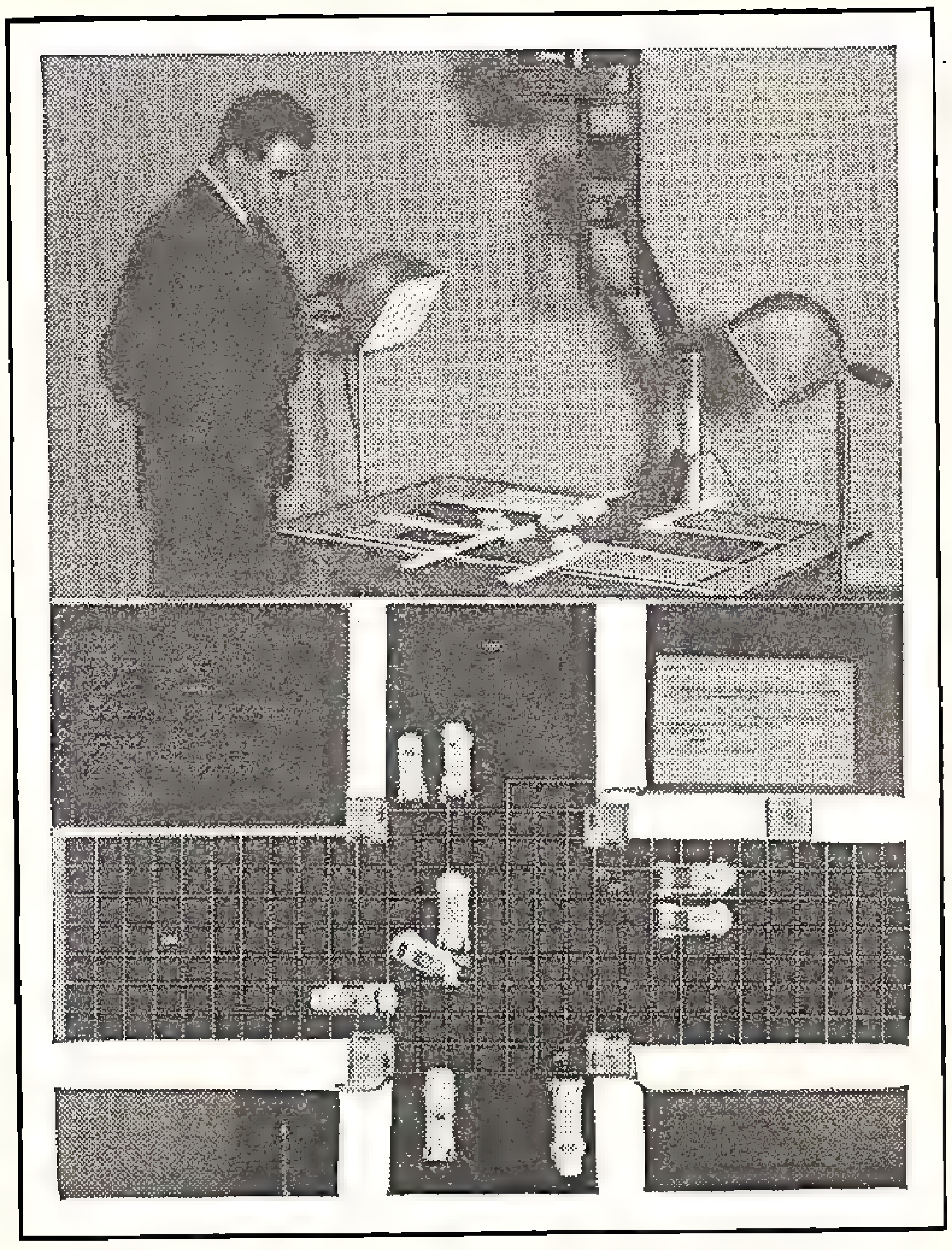
WHEN Donald Pletsch, a veteran stilt-walker, grew tired of being a mere long-legged pedestrian he decided to come down closer to earth, so he built himself a pair of one-wheeled skates from the remains of a coaster wagon. Walking on them appears to be a simple feat, but try it yourself and you'll find out differently.

Camera Records Auto Accidents

CONFLICTING reports of traffic accidents need no longer baffle judges and juries, if an ingenious new camera recently introduced functions the way it is expected to.

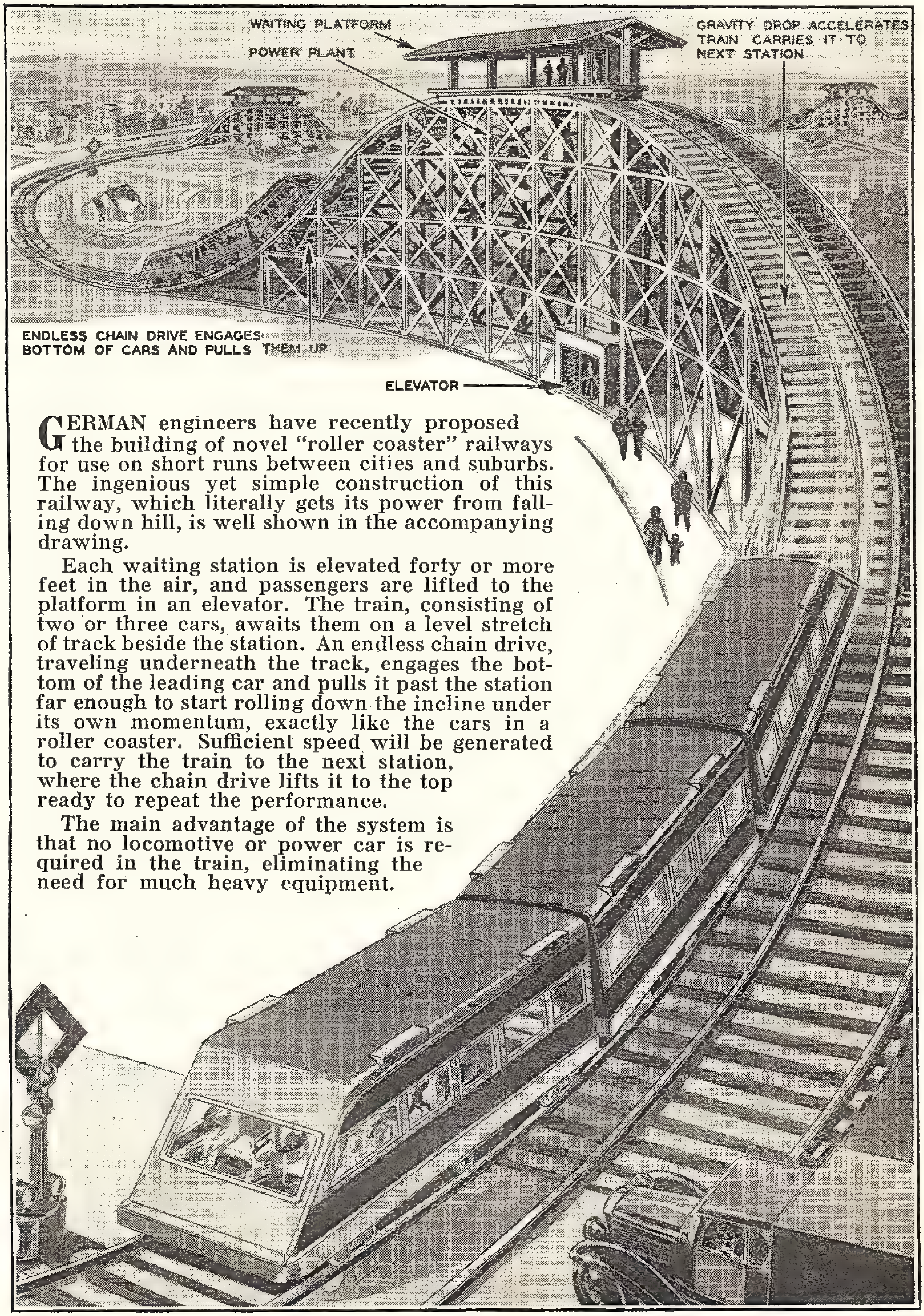
The purpose of the "evidence camera," as it is called, is to photograph a diarama of the accident. While the details of the accident are still fresh in the minds of the witnesses a miniature of the scene is reconstructed and photographed with the "evidence camera."

Then when the case is brought before the court in a lawsuit, the photograph is introduced to give a clear picture to the jury of the way the accident happened.



At top is seen the evidence camera photographing scene of an accident in miniature. Below, photo shown to jury.

A RAILWAY *that* FALLS *Down Hill*


WAITING PLATFORM
POWER PLANT
GRAVITY DROP ACCELERATES TRAIN CARRIES IT TO NEXT STATION
ENDLESS CHAIN DRIVE ENGAGES BOTTOM OF CARS AND PULLS THEM UP
ELEVATOR

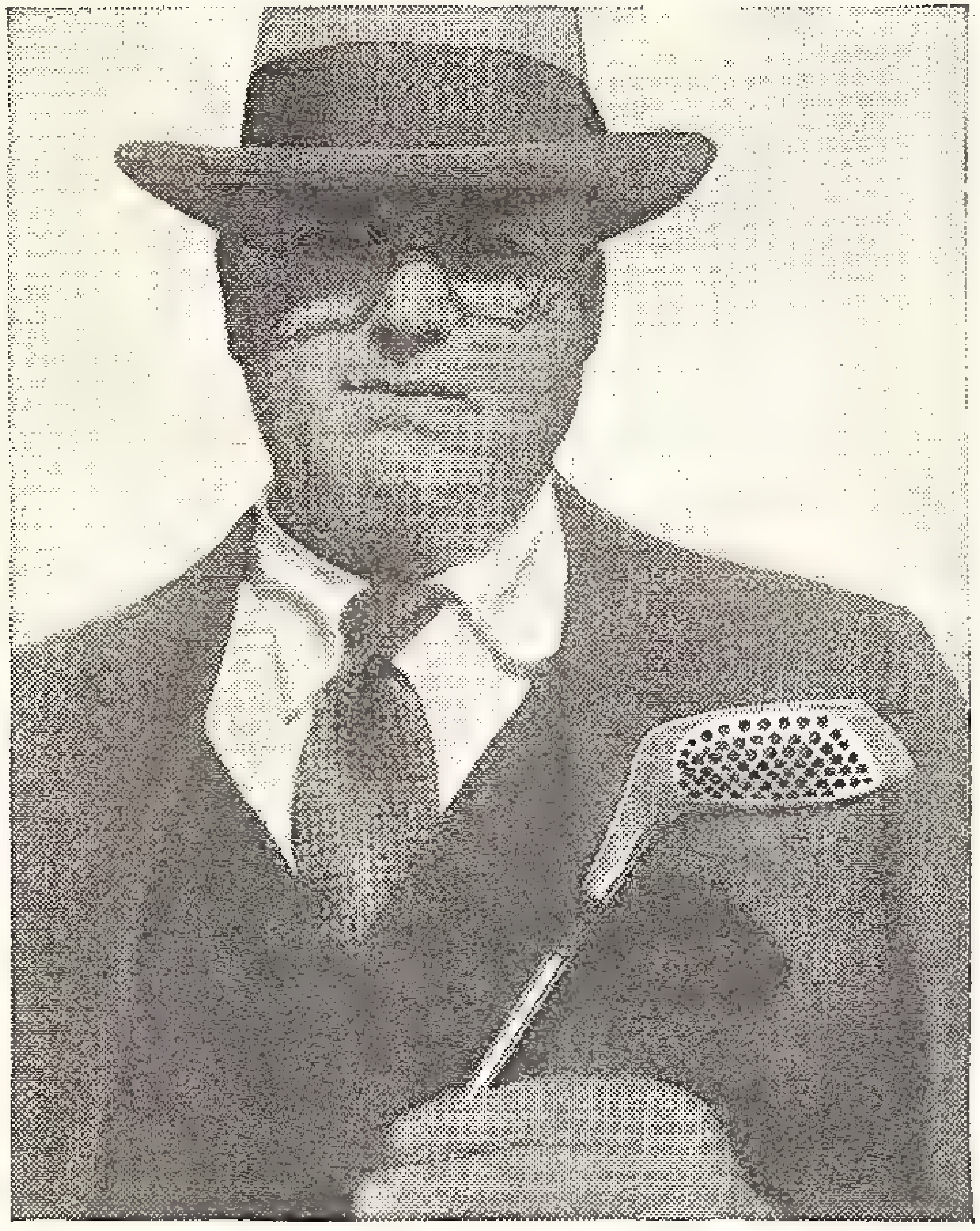
GERMAN engineers have recently proposed the building of novel "roller coaster" railways for use on short runs between cities and suburbs. The ingenious yet simple construction of this railway, which literally gets its power from falling down hill, is well shown in the accompanying drawing.

Each waiting station is elevated forty or more feet in the air, and passengers are lifted to the platform in an elevator. The train, consisting of two or three cars, awaits them on a level stretch of track beside the station. An endless chain drive, traveling underneath the track, engages the bottom of the leading car and pulls it past the station far enough to start rolling down the incline under its own momentum, exactly like the cars in a roller coaster. Sufficient speed will be generated to carry the train to the next station, where the chain drive lifts it to the top ready to repeat the performance.

The main advantage of the system is that no locomotive or power car is required in the train, eliminating the need for much heavy equipment.

Operating details of the roller-coaster railway proposed by German engineers. A train gathers speed by plunging down the incline from the station, carrying it to the next station where it is hauled to the top by a chain drive.

Golf Club With Perforated Head Permits Longer Drives



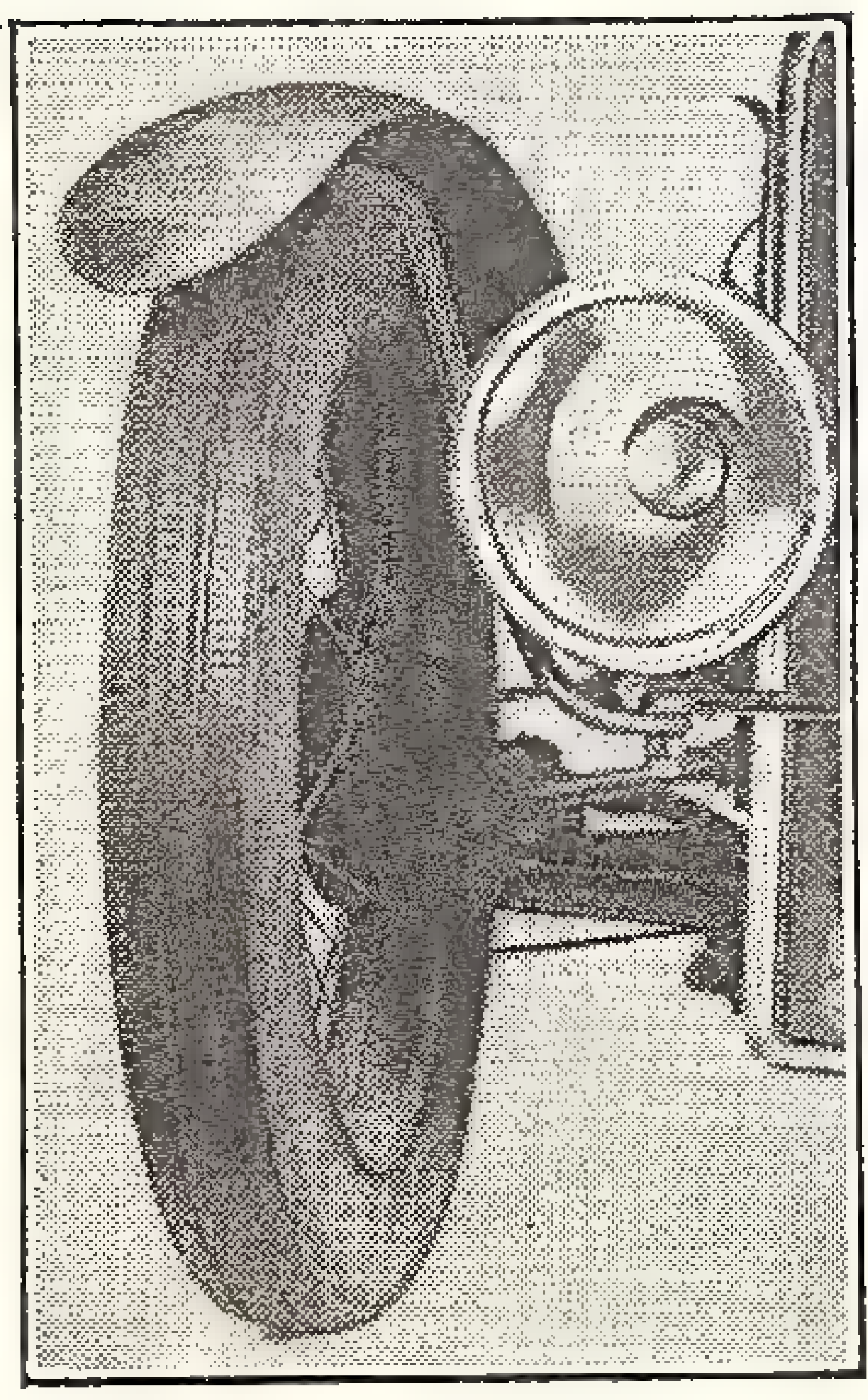
Lessening resistance of downward swing, perforated head of club permits harder swat, lengthening drive 15-25 per cent.

A 15 TO 25 per cent increase in distance on drives is promised for the user of a new performance golf club that has recently been introduced. What gives the increased efficiency is the lessened air resistance of the head, which is hollow and perforated with eighth inch holes on the striking side. Dr. E. M. Thomas, of Independence, Mo., the inventor, is seen holding his creation in the photo at the left.

Rubber Streets to Save Buildings

A WAY to save many historic buildings in European cities, such as Westminster Abbey in London, from destruction by street vibration was proposed by Sir Stanley Bois of London. It is to pave all streets in the neighborhood of such buildings with thick rubber blocks, so that the millions of daily shocks now imparted to roadways by trucks, busses and other heavy vehicles will be absorbed by the rubber before reaching the foundations of the buildings.

Non-skid Tire Has Rubber Studs



Three rows of rubber studs grip the ice to prevent skidding.

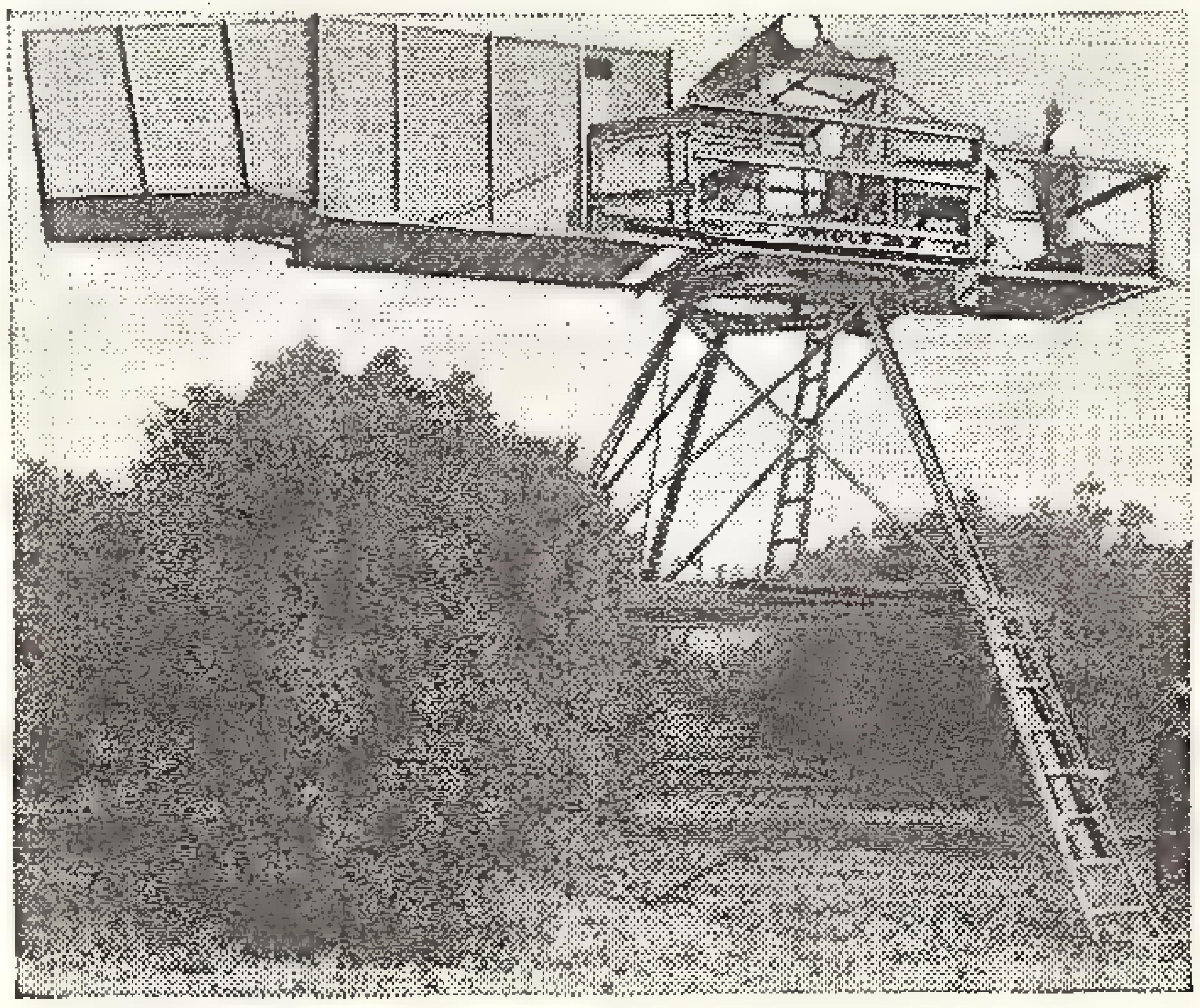
A NEW anti-skid auto tire recently demonstrated on the ice rink of the Palais des Sports in Paris promises to revolutionize the auto tire industry. The tire, seen in the photo at the left, consists of two outer rows of studs on the tire composed of ordinary rubber and a center row made of soft rubber. The demonstration proved a complete success and may be adapted on racing autos.

Grind Organ Shoots Mechanic

THE most unusual accident reported in years, in which a young mechanic was shot through the heart by an ordinary grind organ, was uncovered recently in Vienna. The young man had obtained an old and dilapidated organ which he proceeded to repair. The spring, which was wound up tightly and stuck, came loose and unwound violently. Immediately the young mechanic slumped to the floor and was found to be dead.

A police officer ordered a complete X-ray examination of the body. Then the secret was disclosed. By the rapid unwinding of the spring a tiny projectile from the spring was shot through the young mechanic's clothing and directly into his heart, the shock being responsible for his death.

Huge Blowers Fight Orchard Frost



Ford motor driving propeller directs blast of air from rotating "gun" to reduce frost peril to California orchards.

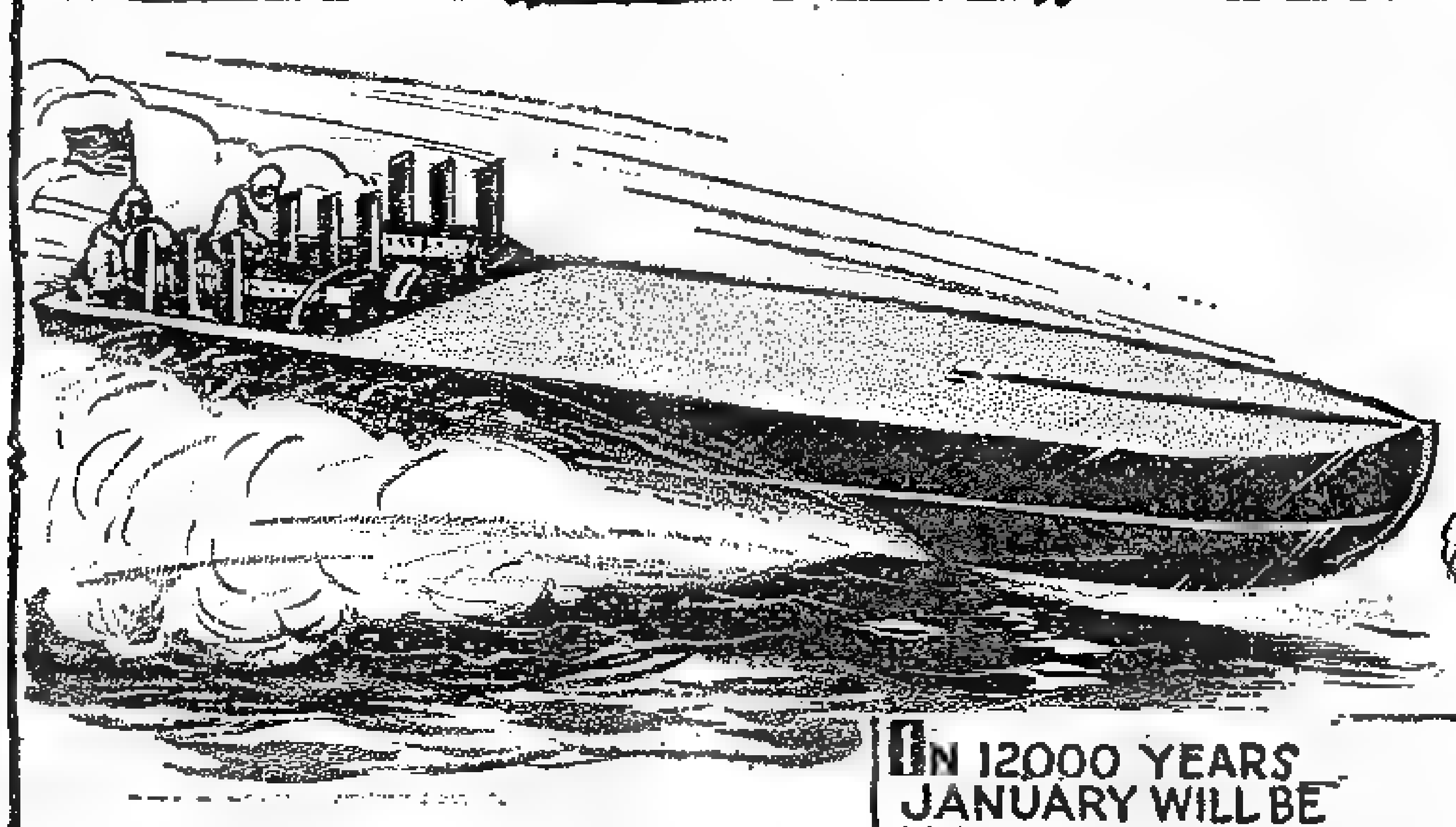
ORCHARDISTS all over the country are watching with keen interest the progress made by the giant wind machines that have been installed in Southern California.

The wind machines are essentially huge blowers spouting a stream of air over the trees to combat the winter frost evils. The blower is mounted on a steel tower and is so constructed that it revolves in a complete circle to cover every section of the orchard.

The power plant consists of a Model T Ford engine turning a prop which directs a stream of air out the spout. The deflector directs the air downward.

Oddities of SCIENCE

by NIC SPRANK

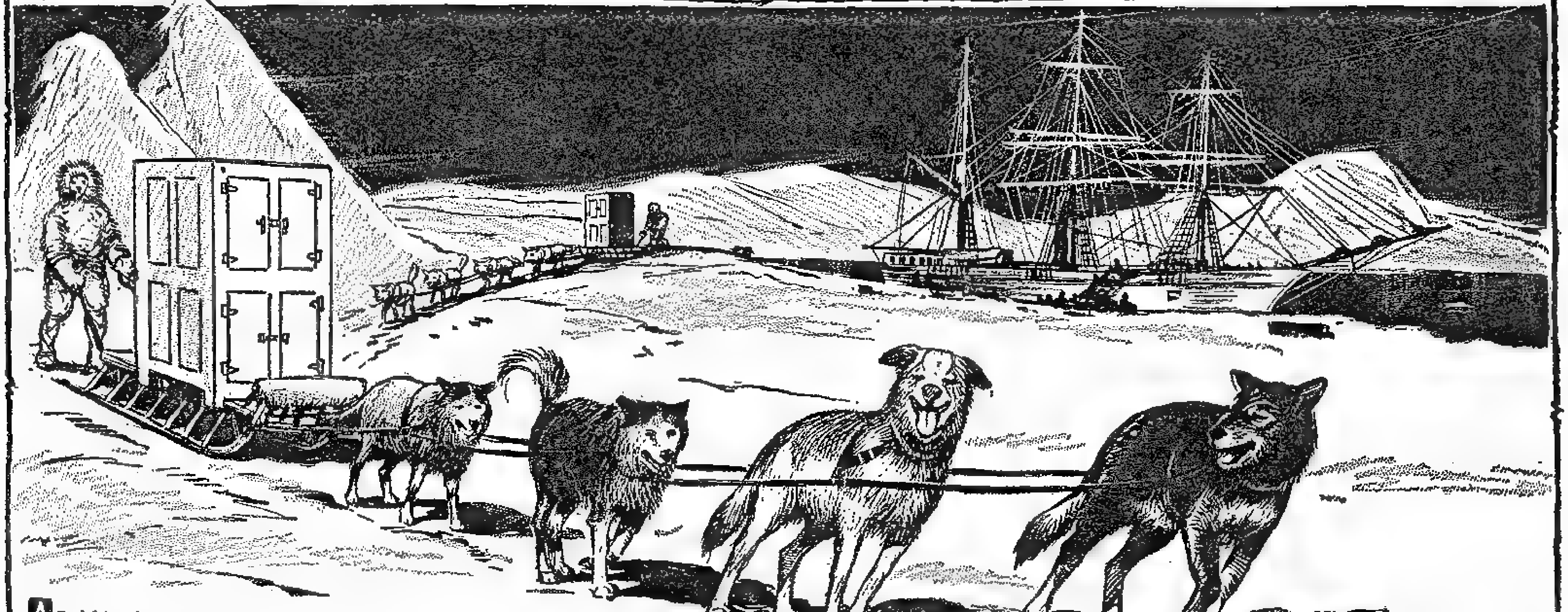


FRICTIONAL HEAT DEVELOPED BY A SPEEDBOAT WOULD BURN IT TO A CINDER IF SURROUNDING WATER DIDN'T CARRY AWAY HEAT.—*John S. Carpenter, York, Pa.*

IN 12000 YEARS JANUARY WILL BE MID-SUMMER AND JULY MID-WINTER. *(Precession of Equinoxes shifts poles of the heavens completely around in 25,000 years.)* —*Russell Mort, St. Louis, Mo.*

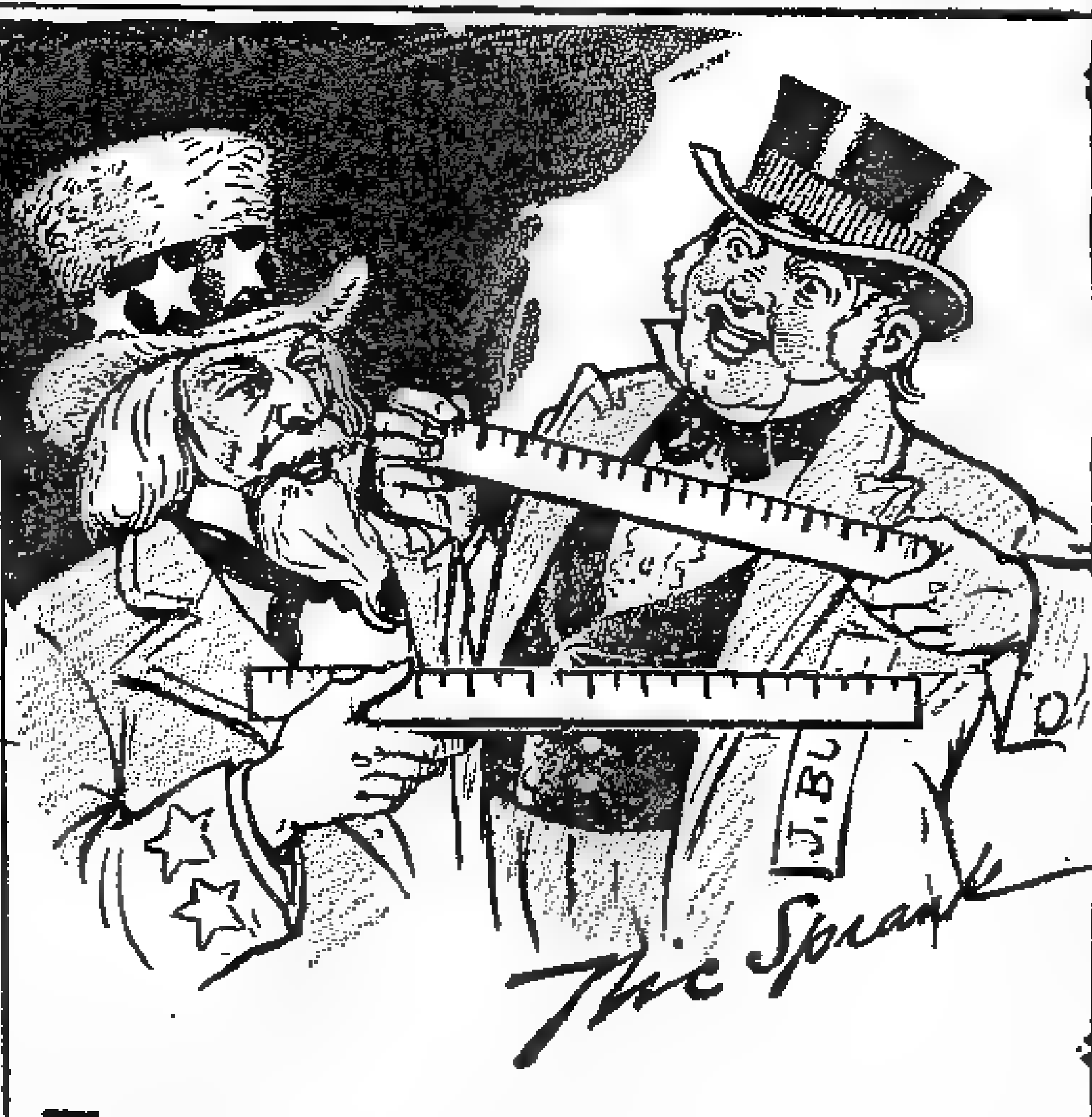
1 OZ. POTASSIUM IODIDE
1 OZ. WATER
1 OZ. POTASSIUM IODIDE SOLUTION

ONE OZ. POTASSIUM IODIDE + 1 OZ. WATER = 1 OZ. POTASSIUM IODIDE SOLUTION.—*Lawrence S. Mann—Chicago, Ill.*

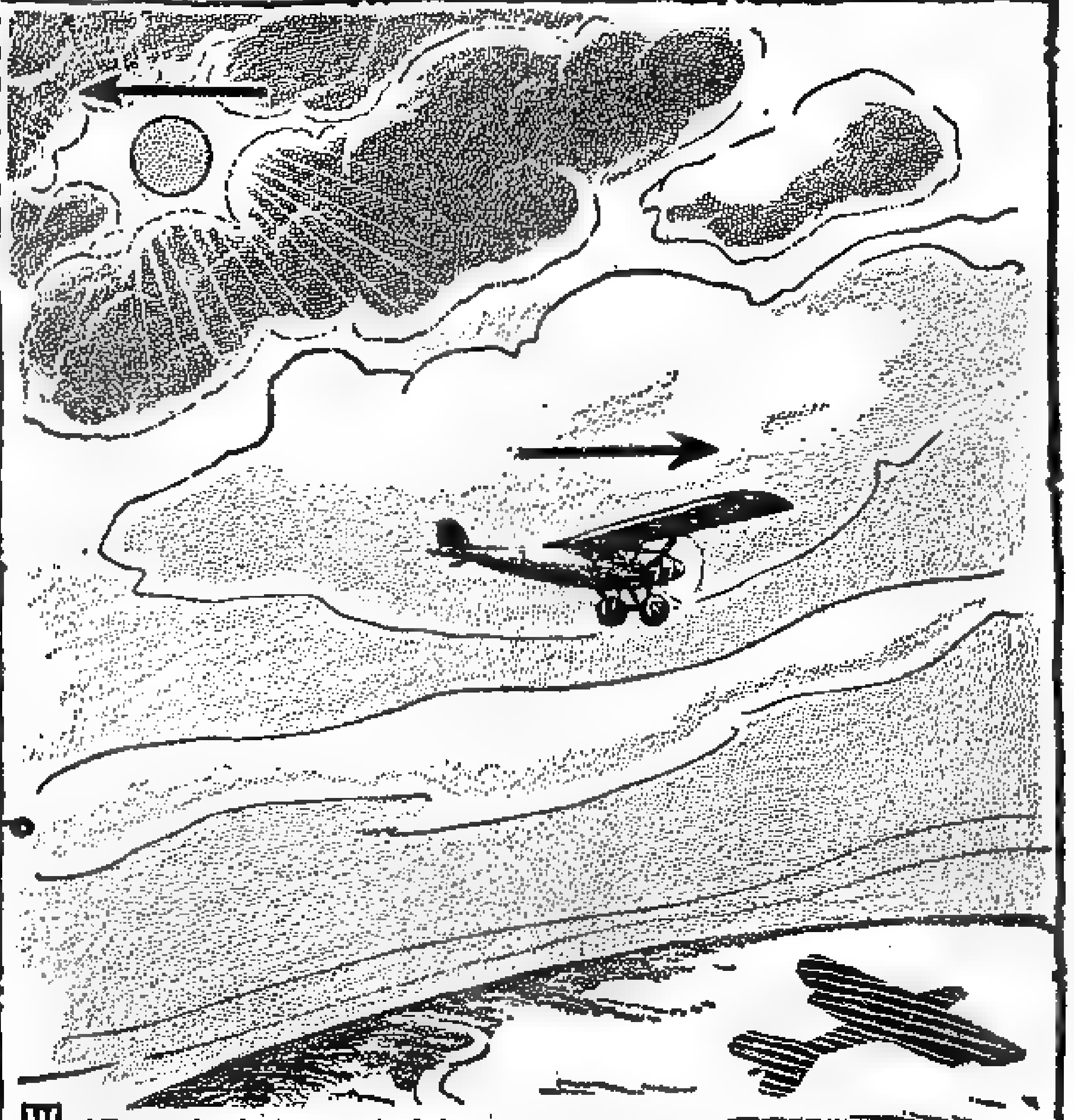


ADMIRAL BYRD TOOK TWO ICE BOXES TO THE SOUTH POLE TO KEEP FOOD FROM FREEZING!—*Perry Schlack, Inglewood, Cal.*

DIAMONDS, HARDEST KNOWN SUBSTANCE, CAN BE SPLIT WITH A KNIFE.—*(A tap on a knife blade pressed against a microscopic seam in the diamond will split it apart.)* —*George Swift, Holliston, Mass.*



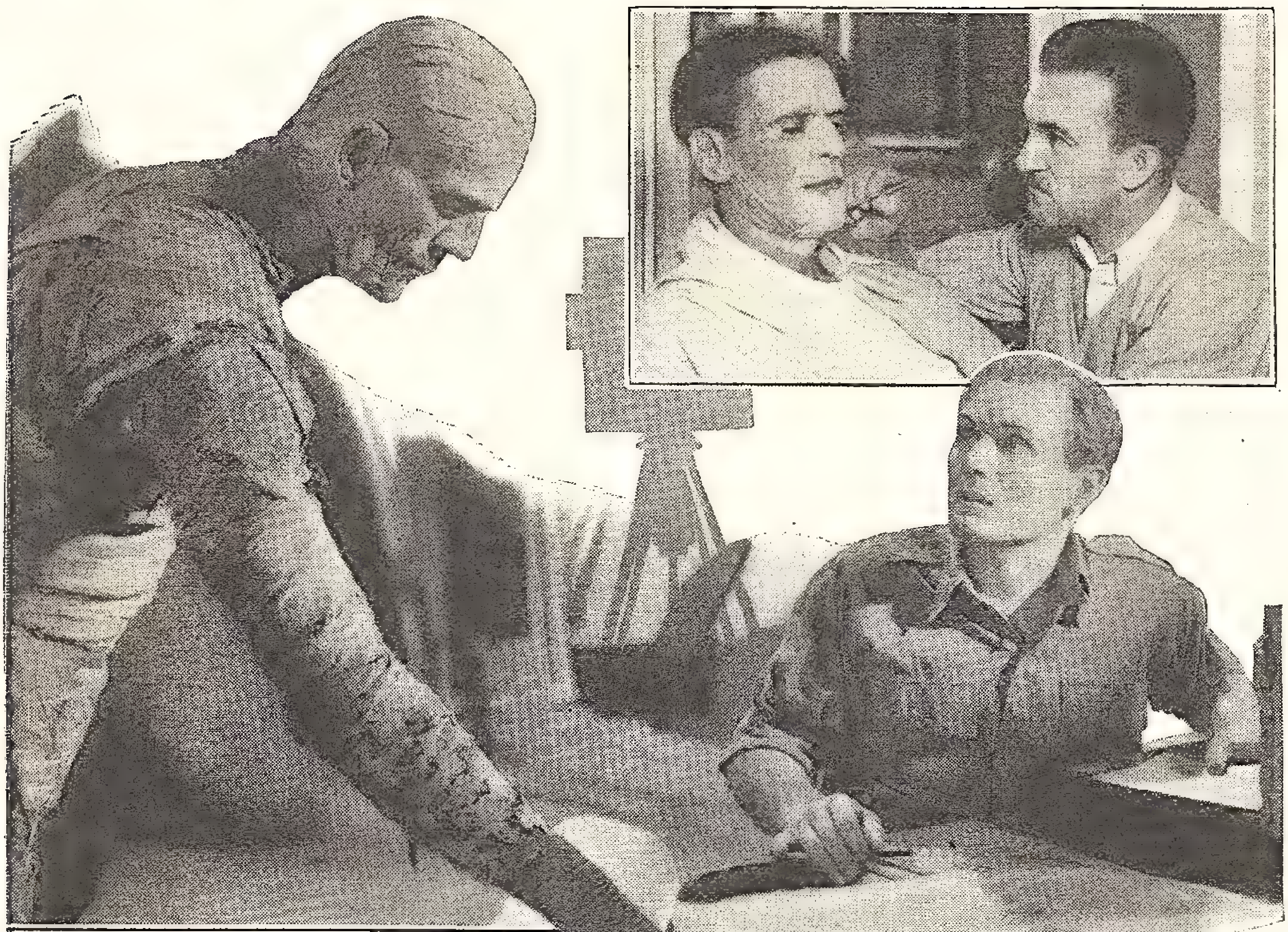
AN INCH IS LONGER IN THE UNITED STATES THAN IN ENGLAND.—*(U.S. inch is 1/38.37 meter or 2.54 centimeters. British inch is 1/36 yard or 2.53 centimeters.)* —*Van S. Camp, Portland, Ore.*



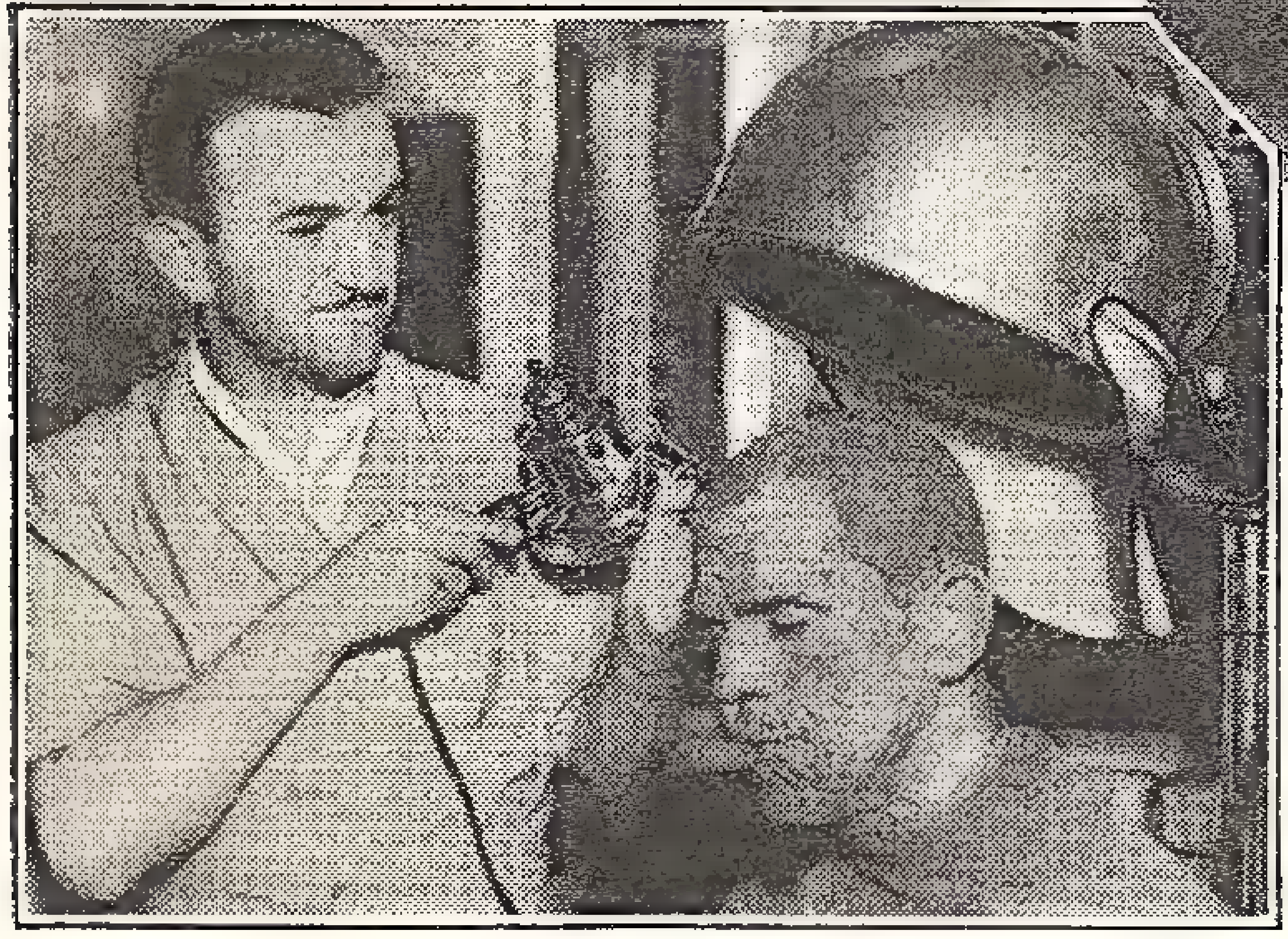
WHEN AN AIRPLANE FLIES EAST, ITS SHADOW MOVES FASTER THAN THE PLANE, DUE TO THE APPARENT MOTION OF THE SUN.—*Thomas Condax, Philadelphia, Pa.*

ONE DOLLAR will be paid by Nic Sprank for oddities of science used on this page. Send in your ideas—no limit to the number of suggestions you may make, but be sure to enclose proof of your statements. Maybe your ideas will be better than those shown on this page—if they are, Nic Sprank wants them and will be glad to send you a check. Address suggestions to Nic Sprank, care of Modern Mechanix and Inventions, 529 South Seventh Street, Minneapolis, Minn.

MAKEUP SECRETS of



This terrifying scene from "Im-ho-tep" shows Karloff as he appears in his mummy makeup—an exact duplicate of real mummies found in ancient tombs. In photo at top Pierce is seen applying the first layer of makeup—cotton and spirit gum—to Karloff's face.



In transforming Karloff into a mummy, Pierce encountered greatest difficulty in making up the hair. On top of a layer of liquid grease paint, which acted as a base, was patted a mixture of beauty clay and fullers' earth, which was then dried.

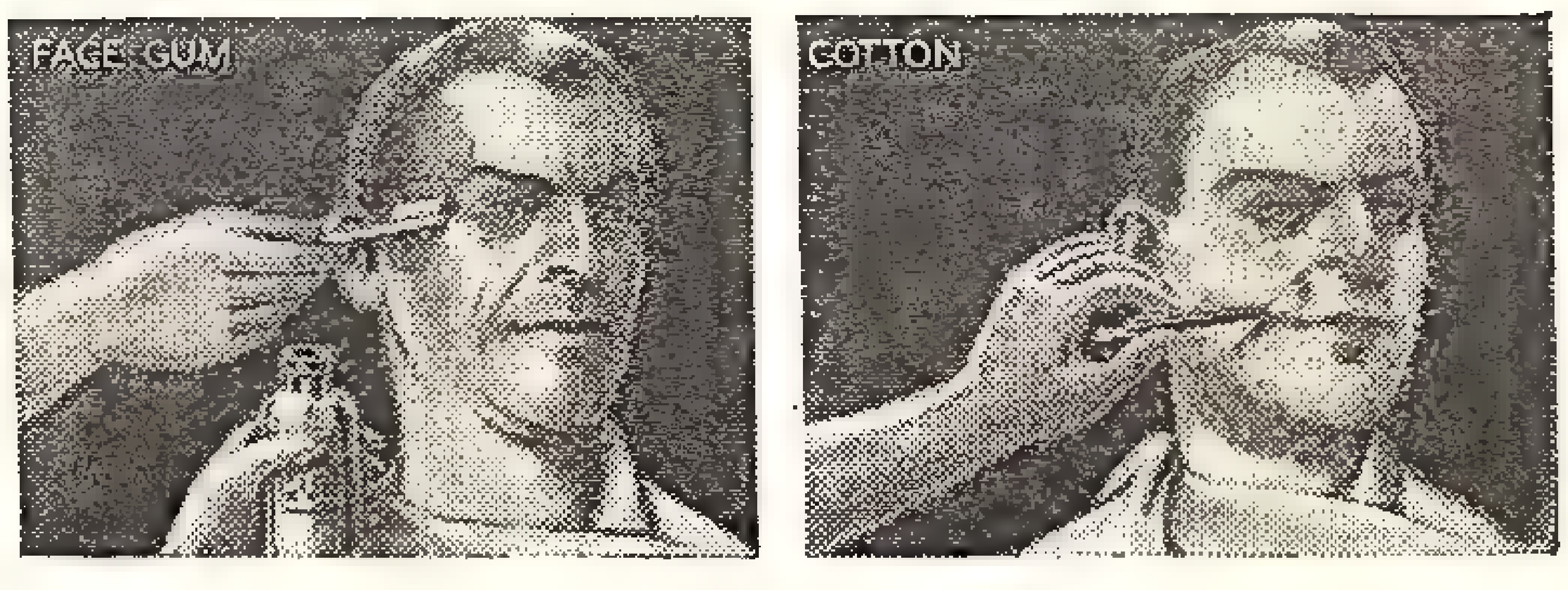
by JAMES BOWLES

FROM the depths of an ancient casket a bony and shriveled hand stretched back across history thirty-seven centuries to snatch a scroll from a terror-stricken actress.

Deep, gray lines of age streaked the hand. Dust fell from ancient fingers. Yet it moved, actually grasped the parchment, and disappeared from the screen.

Outside the camera angle sat Boris Karloff. It was his hand whose antiquity the camera revealed, a hand "mummified" earlier in the morning by Jack Pierce, movie make-up expert, who recently produced a living mummy in the person of Karloff, complete in 1500 feet of rotted cloth bandages, wrinkled skin, closed eyes and the yellow hair of a person dead many centuries.

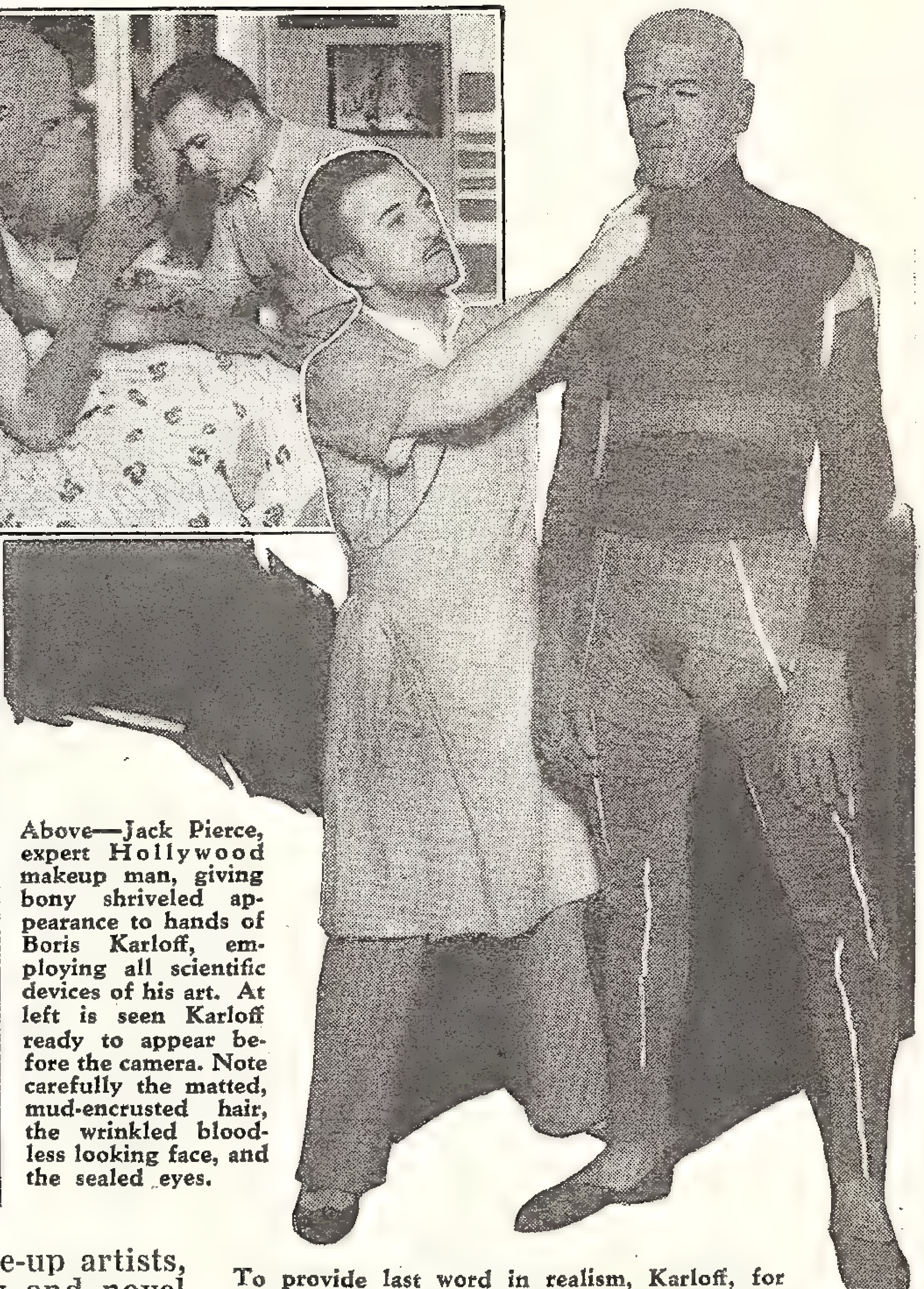
The "mummy" represented the latest

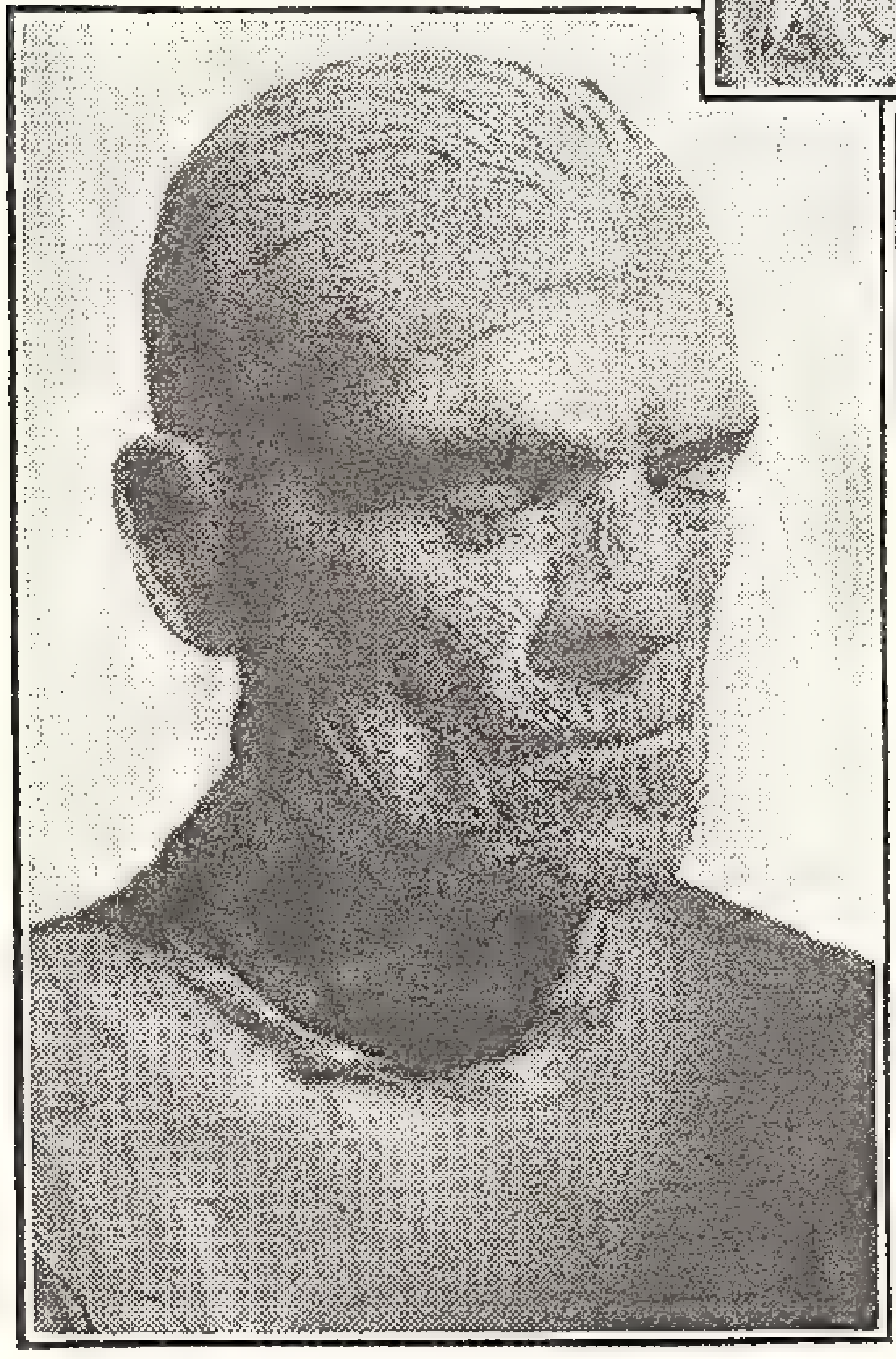


First step in "mummifying" face was application of special gum; second, plastering skin with layer of glue and cotton.

Movie HORROR Pictures

When you shudder at the sight of frightful characters in horror movies, it is usually the makeup man who is responsible for your thrills. Read here how he creates actors that terrify you.





Above—Jack Pierce, expert Hollywood makeup man, giving bony shriveled appearance to hands of Boris Karloff, employing all scientific devices of his art. At left is seen Karloff ready to appear before the camera. Note carefully the matted, mud-encrusted hair, the wrinkled bloodless looking face, and the sealed eyes.

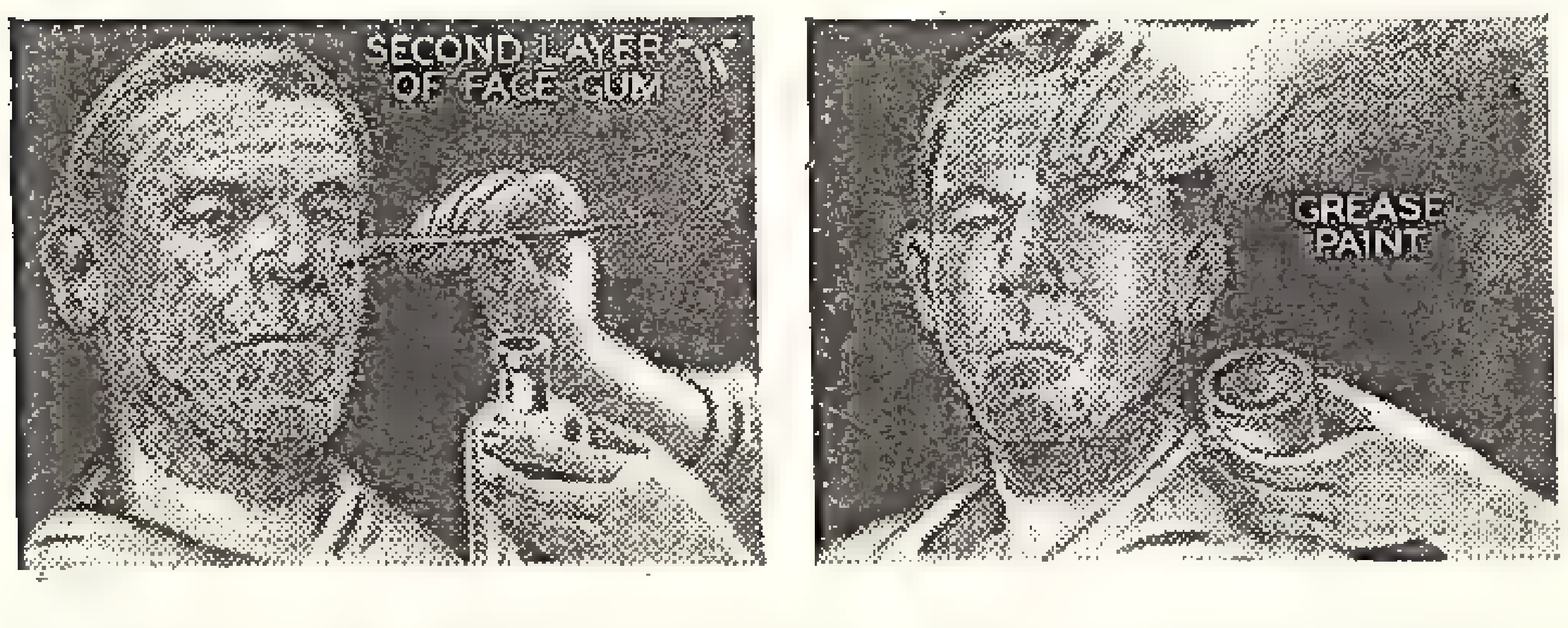
To provide last word in realism, Karloff, for his appearance in the movie story of Egyptian reincarnation, was wrapped in shroud of charred cheese cloth, which was later brushed over with caked mud. In the filming the mud crumbled off when mummy rose from its ancient coffin, coming to life after some 3700 years.

achievement of the movie make-up artists, who strive constantly for new and novel means of bringing striking figures—living and dead—to the screen. On three different occasions Pierce turned Karloff into either a part or a whole mummy, counterpart of the first mummy ever created.

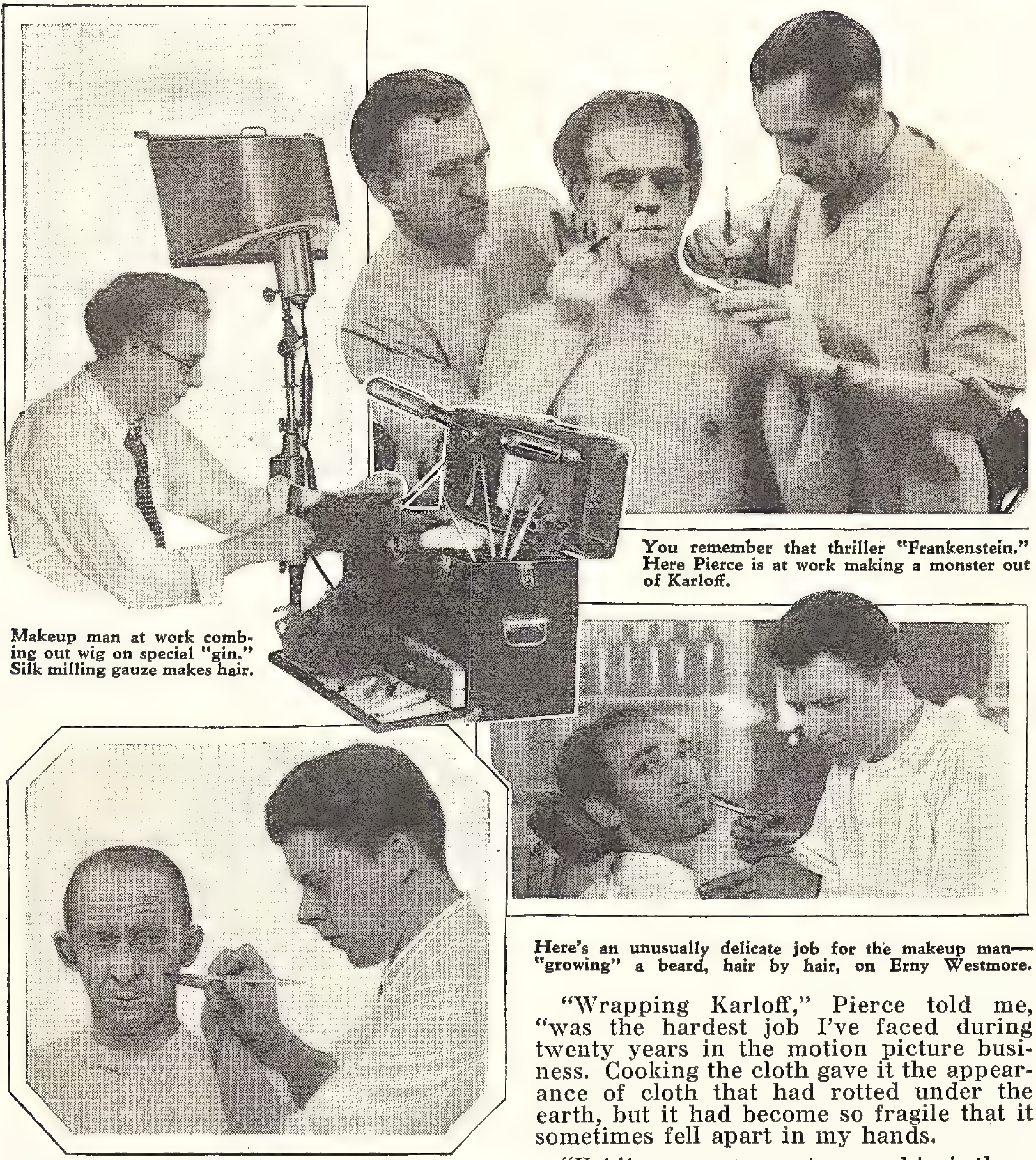
Few persons realize that mummy-making combined science and art among the Egyptians. Pierce searched thirty-five volumes of Egyptian history in his quest for authentic background for this bit of make-believe. "Who," he asked himself, "was the first man mummified, what was used, how was he wrapped?"

All the information he could dig up gave only a suggestion, not a solution of Pierce's problem in turning Karloff into a duplicate of Osiris for "Im-ho-tep," in which picture the mummy comes to life. Manifestly embalming fluids and perfumes have no place in makeup for the camera, so for a month Pierce experimented with pigments, paints, drying materials. He had to have a rotted cloth that would not fall from the body, yet would crumble easily when the body stirred from its coffin. The face must look very old and withered and dry. The eyes must be closed, yet seem to see.

An assistant spent a week feeding double-weight cheese cloth in two widths—two and three inches—through a barrel-like cylinder over a gas flame, winding it gently over a turning wheel. This cooked and


SECOND LAYER OF FACE GUM
GREASE PAINT

Third step: Second layer of gum is brushed on cotton to preserve wrinkles. Fourth: Grease paint applied to cheeks brings out high lights before the movie camera.



Makeup man at work combing out wig on special "gin." Silk milling gauze makes hair.

You remember that thriller "Frankenstein." Here Pierce is at work making a monster out of Karloff.

Here's an unusually delicate job for the makeup man—"growing" a beard, hair by hair, on Erny Westmore.

When characters in a movie are seen to grow old in the story, the makeup man is the one who applies the aging process. Here makeup expert is painting on lines of age.

charred the cloth without actually burning it.

Pierce experimented with 20 dry colors until at last he looked down into his mixing pot on exactly the yellow-gray color with which good mummies are covered. Burnt umber, light umber, fullers' earth, other colors, glue and hot water combined to produce this mud-like substance. With a little cotton and the standard make-up pigments Pierce was ready for the big job—a seven hour ordeal—of turning back the pages of time 3700 years, all for a five-minute effect on the screen.

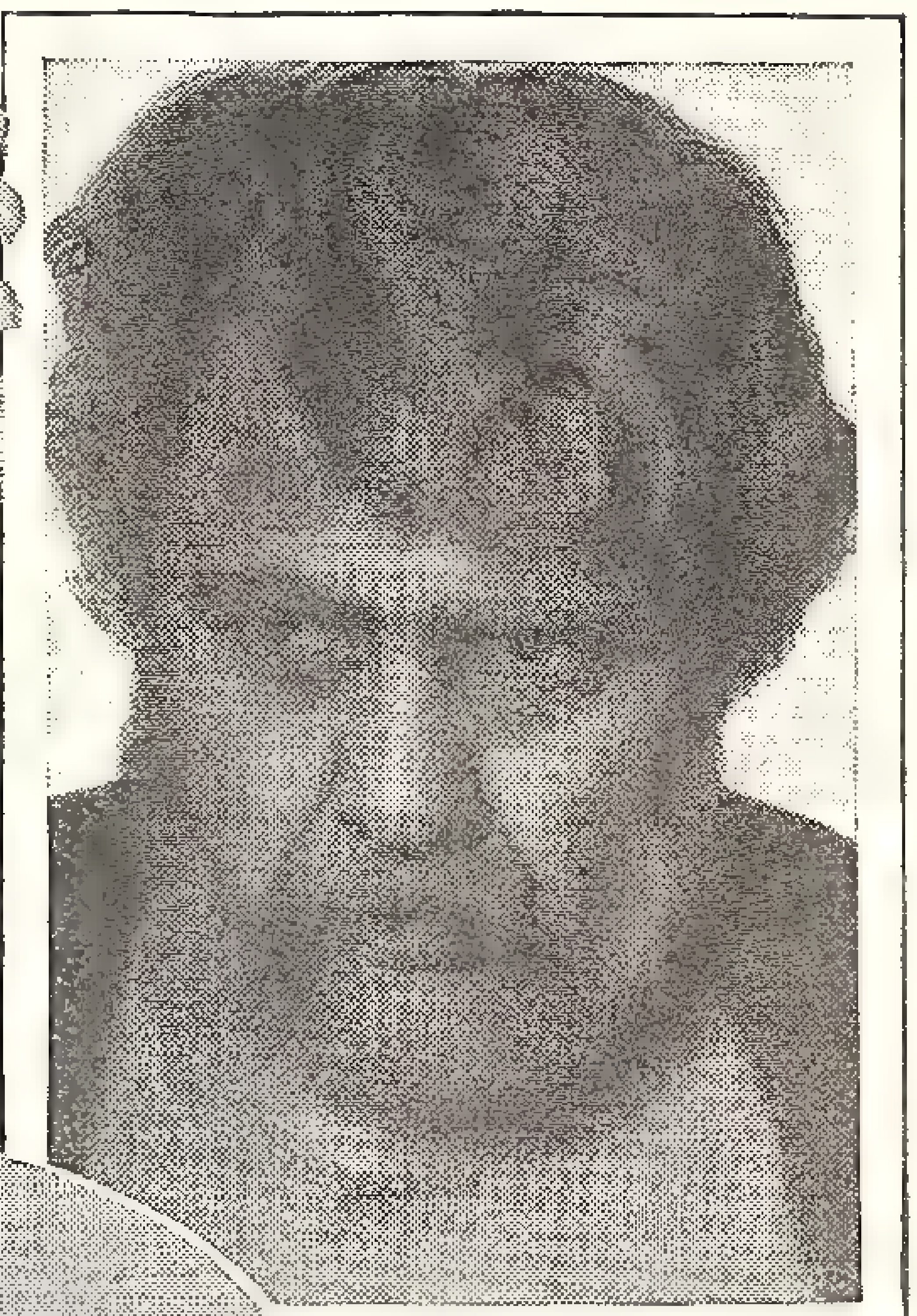
"Wrapping Karloff," Pierce told me, "was the hardest job I've faced during twenty years in the motion picture business. Cooking the cloth gave it the appearance of cloth that had rotted under the earth, but it had become so fragile that it sometimes fell apart in my hands.

"Yet it was necessary to wrap him in three directions—around, vertically and diagonally—so the layers would not separate and reveal his skin. Despite these three layers, when he opened his eyes and moved from his casket, the outer layer crumbled like a thick layer of caked mud and disappeared in a small cloud of dust."

Caked mud really covered the bandages, having been brushed over the cloth. The glue held it together after it had dried, the water gave it the necessary moisture to permit working the colors. Yet the startling and grotesque effect came not so much from the decayed appearance of the body, as from the hands and face. Here was a triumph of movie makeup, as great as any

Makeup Men Can Change Race of Actors, Even Make Over Elephants

Movie makeup men can even change the race of an actor. George O'Brien, the actor at the left, has been made up to look like two Indians, from whom he can't be distinguished. Right—By addition of large ears an Indian elephant has been transformed into an African elephant for "Tarzan."



Recognize the actor above? It's Jean Hersholt in a distinctive makeup — in fact, a masterpiece of the makeup man's art. Note tousled hair, furrowed face, scraggly beard.

ever attained by the immortal Lon Chaney.

Pierce first brushed Karloff's face with a special gum, a secret formula, that retained its moisture so long as the makeup remained on the actor. Over the gum he plastered a thin layer of cotton, specially prepared for this type of work. After the cotton had "set" in the glue, with a pair of tweezers, Pierce pulled out the excess, leaving little valleys where he planned to create the lines of antiquity. Thirdly, another layer of gum was brushed on the cotton, this to hold the outside in exactly the same position as created by the tweezers.

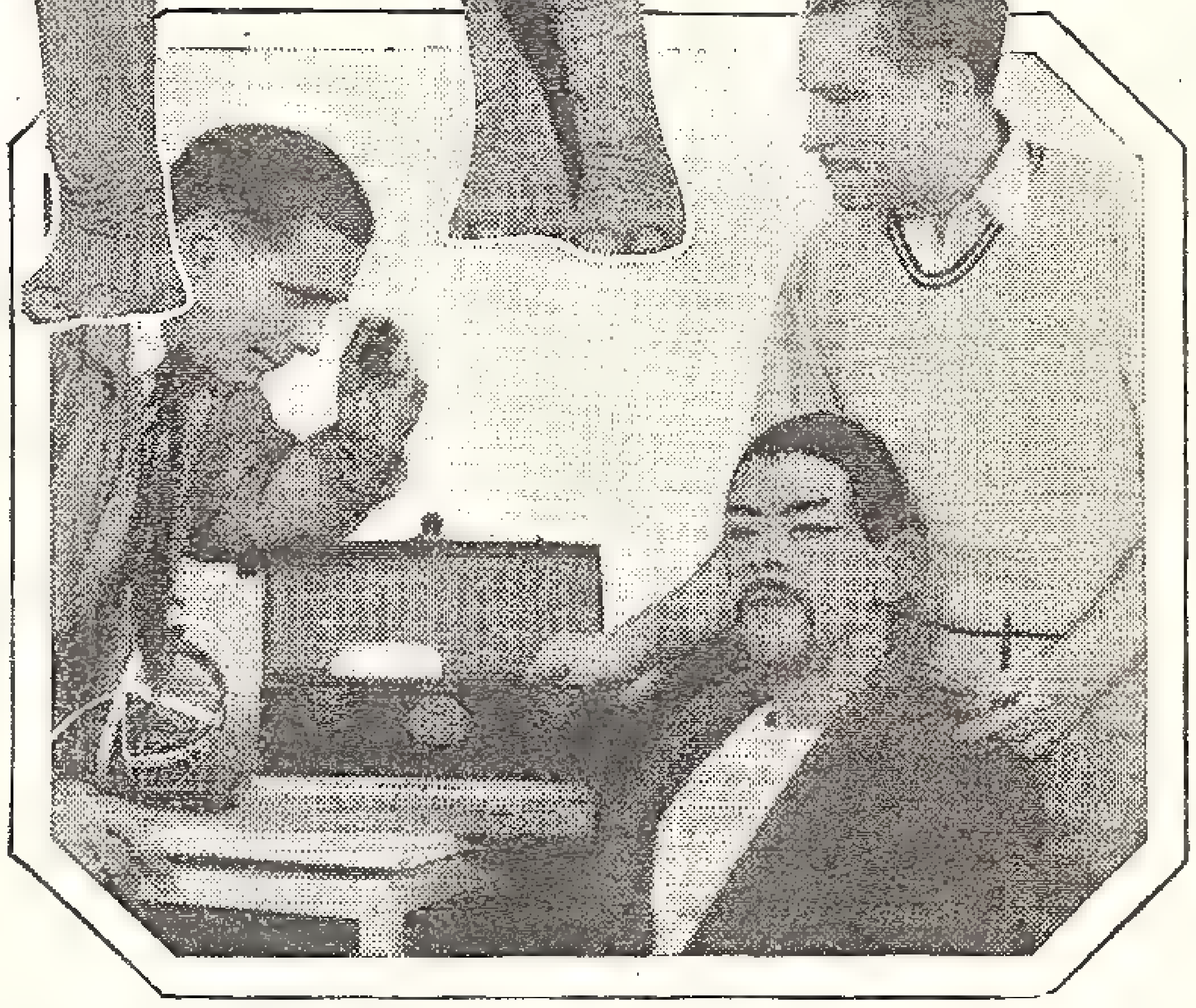
While the face was drying under the hot blast of an electric heater and fan, Pierce turned to the hands. The same process served here.

Actor's Face Made to Look Dead

Having destroyed all life in the face—in fact, having quite obliterated its human resemblance—Pierce found he must restore something of a human quality. A layer of ordinary grease paint supplied an appearance of skin and normal pores and enabled him to deepen the lines in the cotton with a dark brown pencil. This accentuated the deep crevices.

Now a lighter shade of grease paint, spotted on the cheeks, brought out the high lights and depths so essential for the camera.

Technically the most difficult problem came in making up Karloff's hair, for Pierce found he must turn the natural black into an aged yellow. No wig would do here.



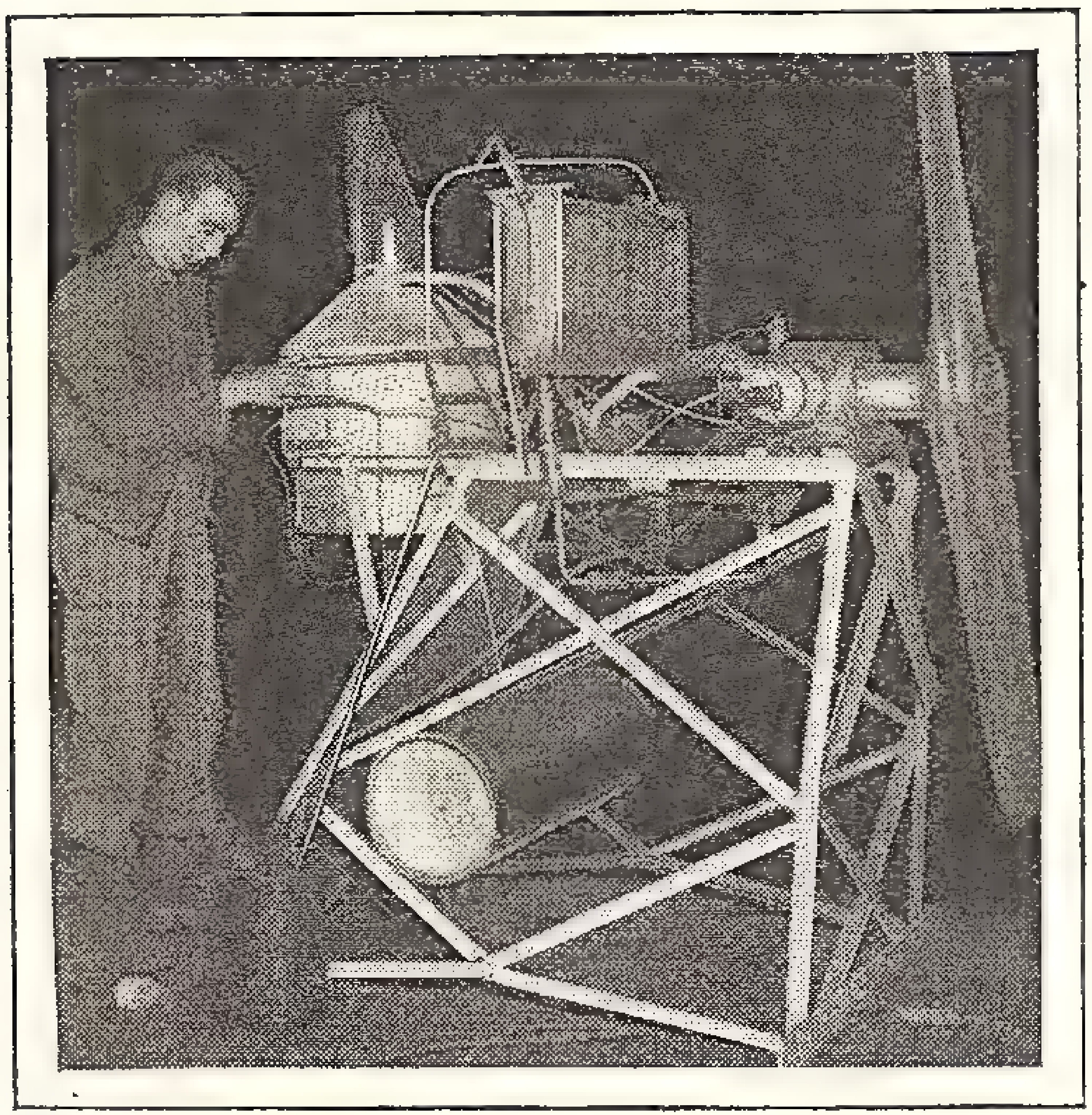
To determine whether any flaws will register on the film, cameraman must study makeup of characters through his blue glass, as demonstrated here. Nils Aster is the actor.

A layer of liquid grease paint, neutral in color, supplied the base. On top of this was patted a mixture of facial beauty clay and fullers' earth. All of which transformed the top of his head into a dirty matted yellow, exactly as the hair on mummies found in recent years looked after nearly forty centuries under the earth.

Final touches for such an exacting makeup are applied after the actor reaches the great sound stage. There Pierce completed wrapping Karloff's legs together and sealed his eyes closed with rice paper, leaving a little horizontal valley in the center of the

(Continued on page 145)

62-lb. Steam Plane Motor Burns 6 Cents Per Gallon Fuel



Harold Johnson, inventor, working on his steam-powered motor which turns a standard OX-5 propeller at 1,250 r.p.m. in silence. Fuel is furnace oil costing 6 cents per gal.

THE long search for an improved airplane motor of high efficiency has resulted in the development of a steam-powered motor which the inventor, Harold C. Johnson, of Akron, Ohio, claims is far superior to the gasoline motors currently in use.

This new engine, which is shown in the photo at the left, is of a two-cylinder opposed design and weighs but 62 pounds. The power it can develop is disclosed in the fact that it can turn a standard OX-5 propeller at 1,250 R.P.M. with complete silence.

For fuel, the engine uses a No. 2 grade of furnace oil, costing only six cents a gallon. High pressure steam is generated in a novel coil and heat for evaporation is furnished by a closed type bunsen burner.

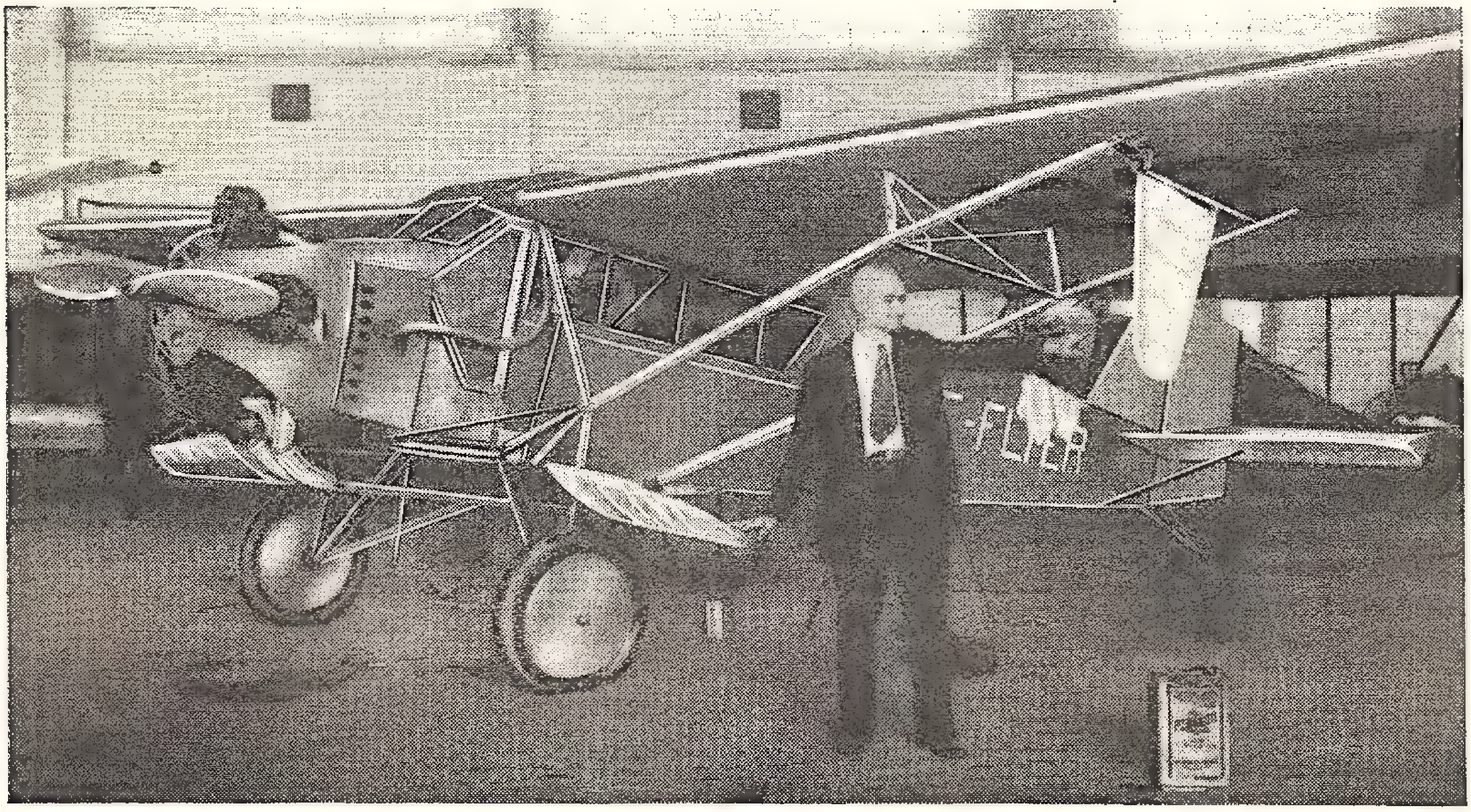
Hot Water Cure for Insomnia

A NEW way of curing insomnia by hot baths to the arms only instead of to the whole body has been devised by a German physician. To use the arm-bath method, the victim of insomnia is laid on a narrow bed or bath table so that both arms can lie in hot water at a temperature of about 95 degrees, Fahrenheit. The temperature of the water is then raised slowly until the bath reaches 110 or 115 degrees. After a few minutes the patient is put to bed.

Stabilizers Fly Plane Pilotless

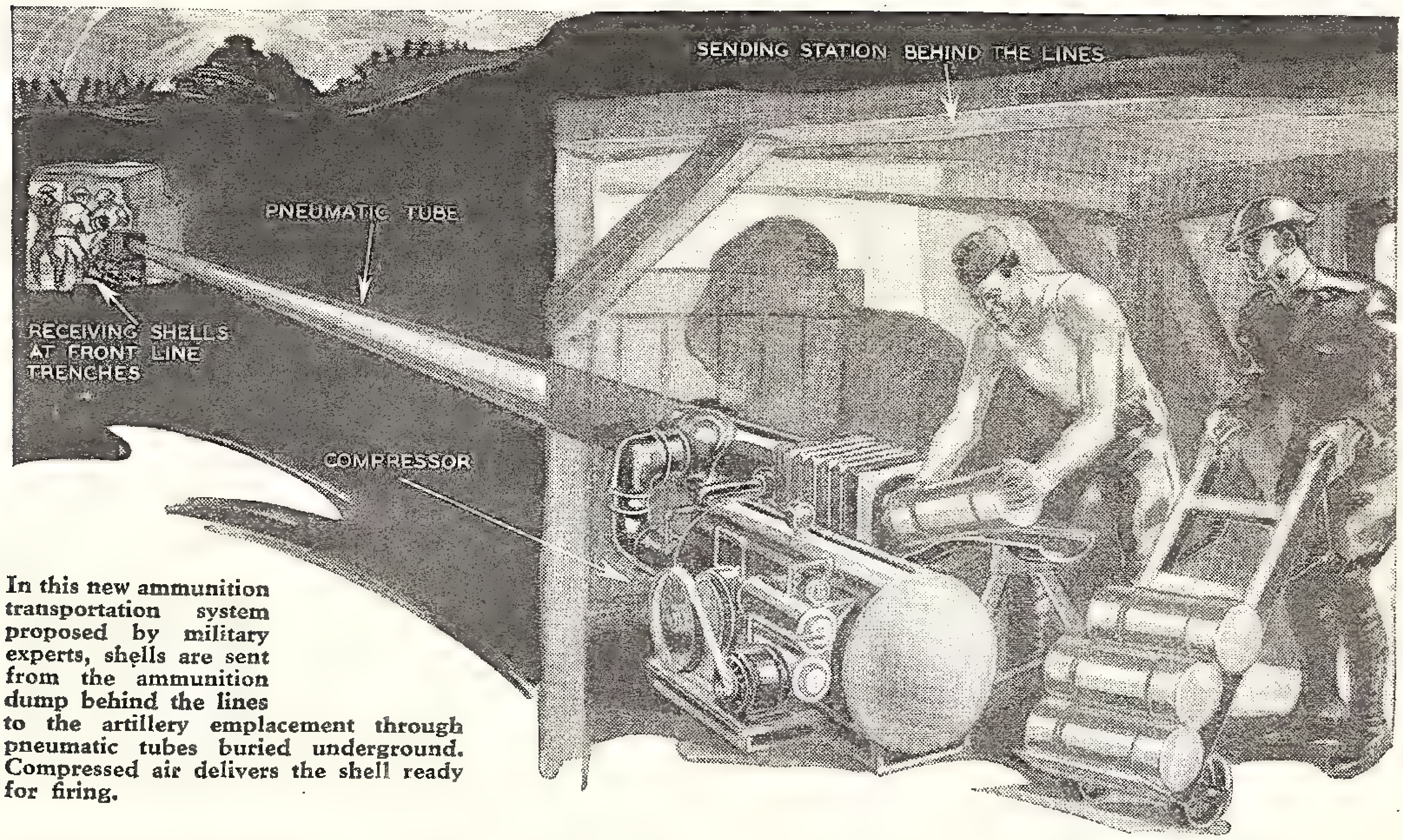
HANDS off flying as long as the gas holds out is now made possible by the invention of the new automatic stabilizer shown in the photo below. The basic elements of the new system are a set of small rudder-like appendages which attach to the underside of the wing and to the lower part of the fuselage, where the lower wing of a biplane should be.

The inventor is Dr. C. H. Vance of Pomona, California. In a severe test of the device, a pilot took off from the Glendale, Cal., airport, put the ship through a series of maneuvers and performed a number of gymnastic stunts on the wings, fuselage and landing gear. Throughout these stunts the plane flew as steadily as if a veteran pilot were at the controls. Thanks to this stabilizing system, efficient radio control may become possible.



Dr. Vance is here shown pointing to the stabilizers on wings and landing gear which permits the ship to fly pilotless.

Pneumatic Tubes Replace Shell Caissons


SENDING STATION BEHIND THE LINES
PNEUMATIC TUBE
RECEIVING SHELLS AT FRONT LINE TRENCHES
COMPRESSOR

In this new ammunition transportation system proposed by military experts, shells are sent from the ammunition dump behind the lines to the artillery emplacement through pneumatic tubes buried underground. Compressed air delivers the shell ready for firing.

TRANSPORTATION of big shells furnishes one of the greatest difficulties of modern warfare. Military engineers are now cudgeling their brains for a scheme to overcome this obstacle, and what might be called the "pneumatic tube caisson" has been the result.

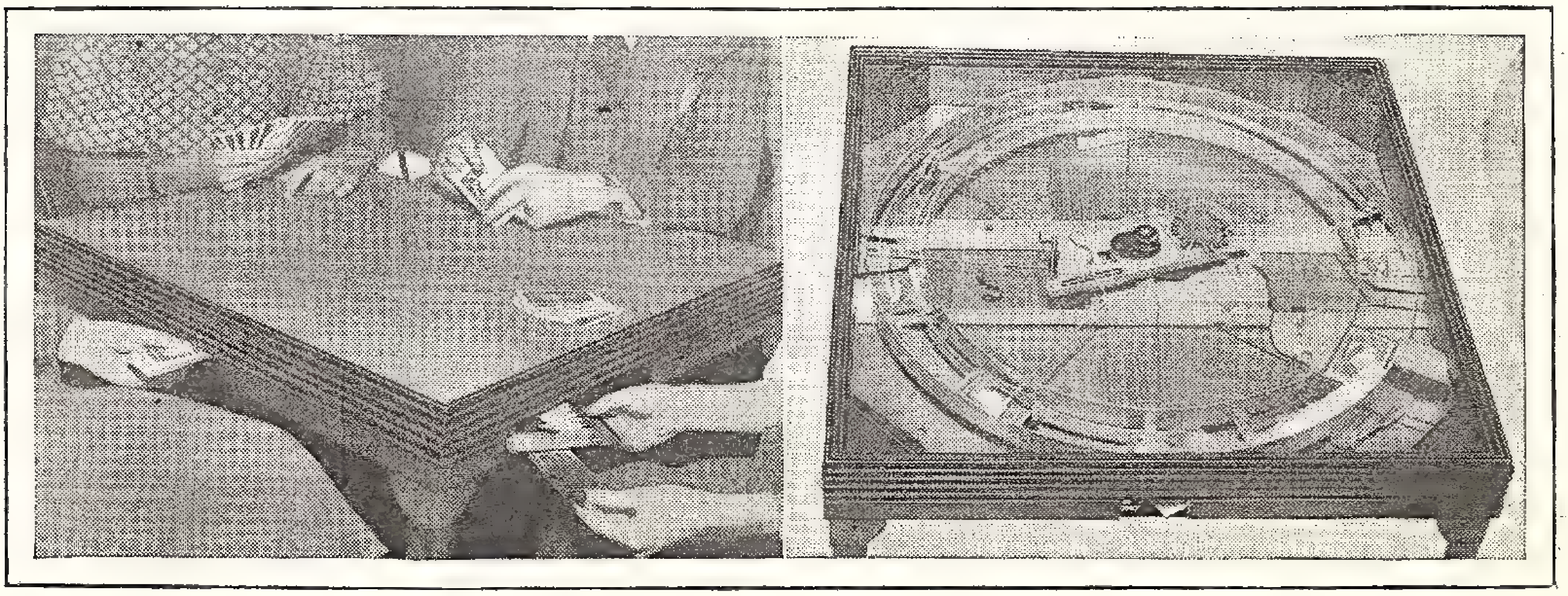
Plans drawn up at a recent conference of military experts call for the construction of a long tube between the ammunition dump behind the lines and the artillery emplacement at the front, as illustrated in the artist's drawing above.

The ammunition is fed into the pneumatic tube at the dump, after which the compressed air is applied to drive the shells to the front. It is believed that this transportation scheme will prove far more reliable and certain than the customary method of hauling the shells with trucks and horses.

Table Deals Bridge Cards

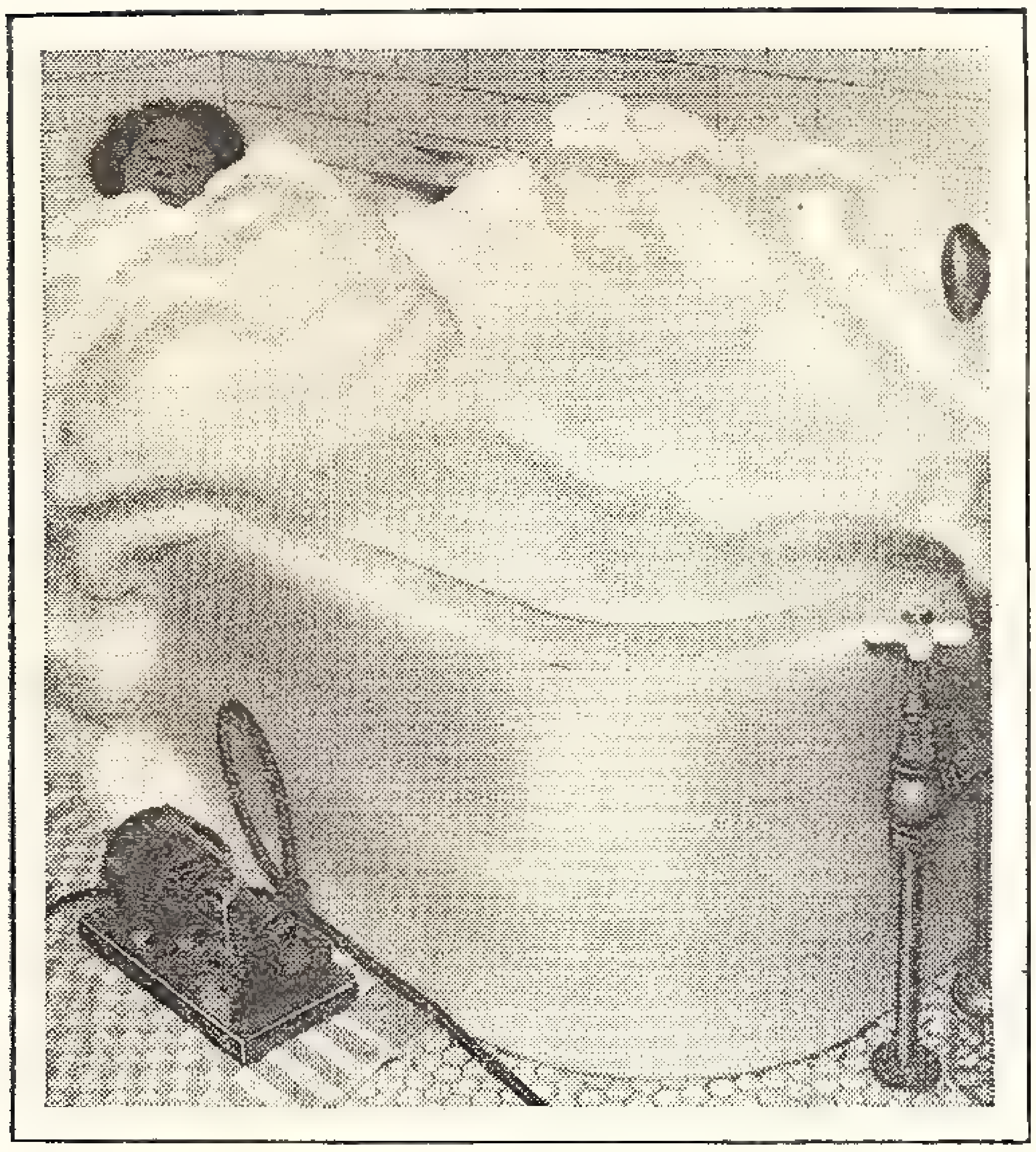
THE latest aid for the expedition of bridge games is a machine which shuffles and deals hand of cards to the players. An interior and exterior view of the table is shown below. When the cards are gathered up after a hand, they are placed in a slot. After this a mechanical arm operated by a motor picks up the cards one at a time and delivers them, shuffling them en route, into a special compartment at the players' finger tips. The machine never deals and shuffles twice in the same manner, and it will never cheat you as a human being might be tempted to do. The players pick up their hands from the apertures at the side of the table, as illustrated below.

One hand can be played while deck is being dealt for next game.



Cards are delivered to players through apertures in the table. At right is seen the shuffling mechanism, which never cheats.

Bath in Ocean of Soapsuds Is Latest Reducing Method



The new "bubble bath" in operation. The waterproof pump on the floor undulates water in tub like ocean surf. Addition of teaspoonful of soap causes heavy foam to rise.

SLEEPING in the clouds has nothing on the "bubble bath," the latest novelty in the way of health gadgets. This device consists of a waterproof electric motor and pump, which connects with a series of long perforated metal tubes placed in the bottom of the bathtub. Air emitted from these tubes causes the water in the tub to bubble and splash like a miniature surf.

By the addition of a teaspoonful of non-alkali soap a heavy foam will form as demonstrated in the accompanying photo. The device has received the approval of eminent medical authorities both as an invigorating bath and as an effective reducing process.

How to Grow Magic Salt Flowers

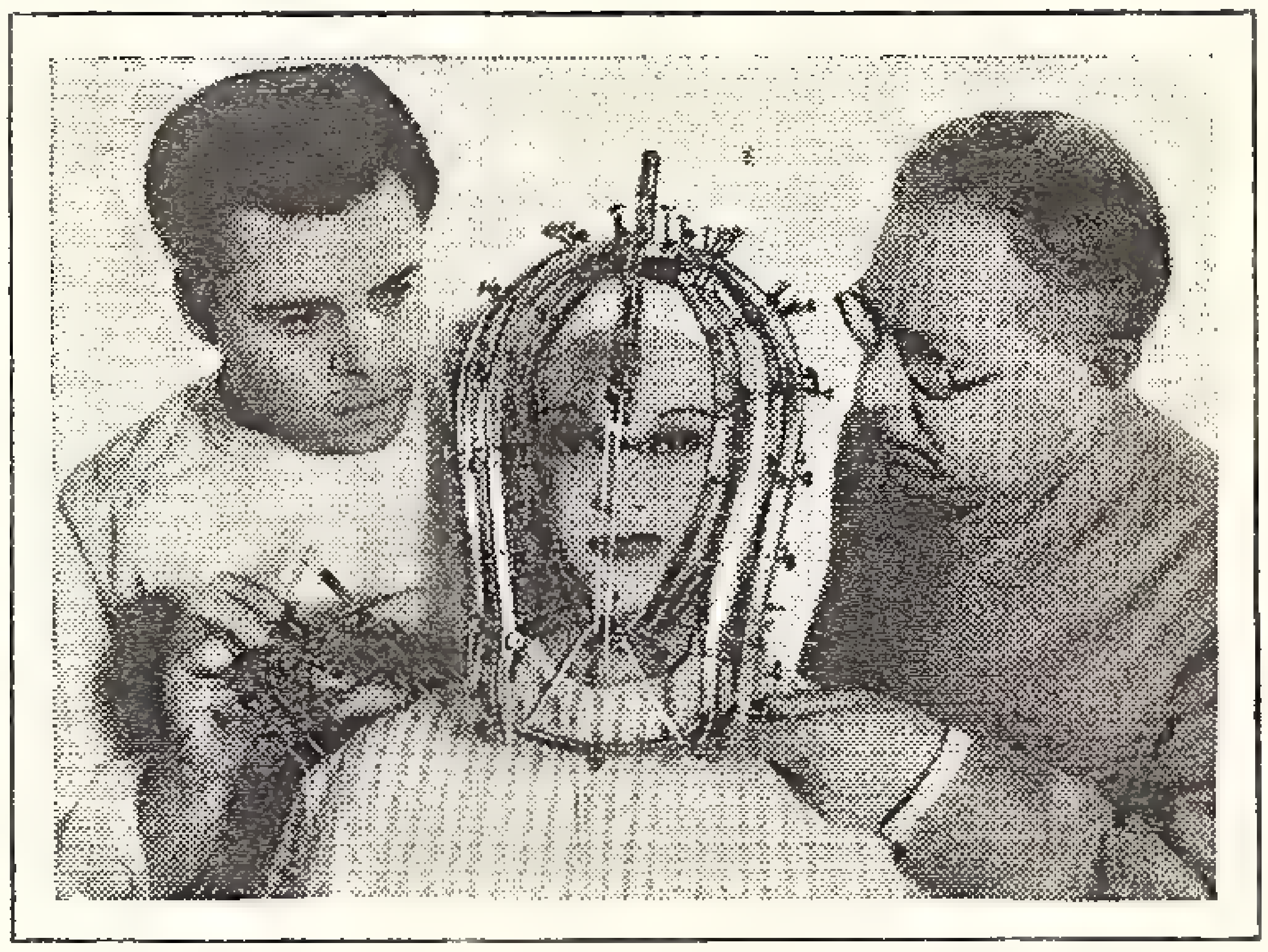
BRIGHT flower-like forms can be grown upon a pebble, a small lump of coal, or any solid non-absorbent object if you follow these simple directions. Place the pebbles in a glass bowl and sprinkle over them two tablespoonfuls of salt. Over this sprinkle two tablespoonfuls of water; and then, two tablespoonfuls of bluing.

One day later repeat the sprinkling of salt and water, leaving out the bluing. On the third day you can do the same. If you want colored flowers sprinkle over the mixture a little mercurochrome. Set the bowl aside in a place where it will not be disturbed and in ten days or two weeks the crystal flowers will have appeared. Capillary action and evaporation does the trick, the saline water being drawn to the top of each layer of crystals and there evaporated to deposit new crystals.

Here are seen the magic salt flowers growing on pebbles in a glass dish. Ingredients for the trick are salt, water, bluing and mercurochrome, procurable at any drug store.

Device Gives Beauty Measurements

FROM Hollywood comes, quite appropriately, a machine to calibrate beauty. The purpose of the gadget, shown below, is to measure to the thousandth of the inch the contours of the face, so that the requisite dimensions for beauty can be determined. Just at the moment, Miss Shelia Terry, actress, is undergoing careful calibration. The males in the photo are Max Factor and Parc Westmore, inventors of the contraption.

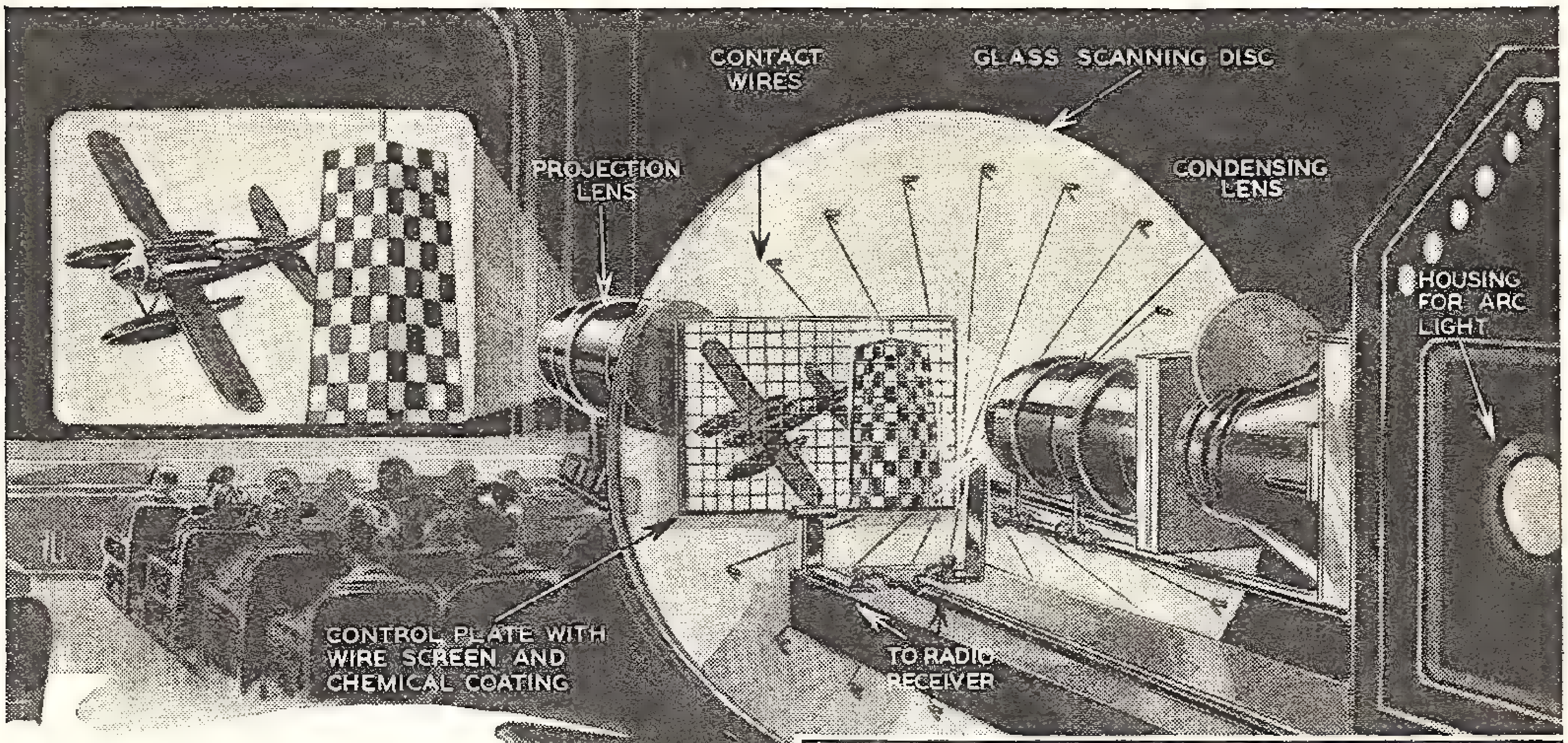


The new beauty calibrating machine which measures to the thousandth of an inch contours of actresses' faces. Careful adjustment gives facial dimensions of famous good lookers.

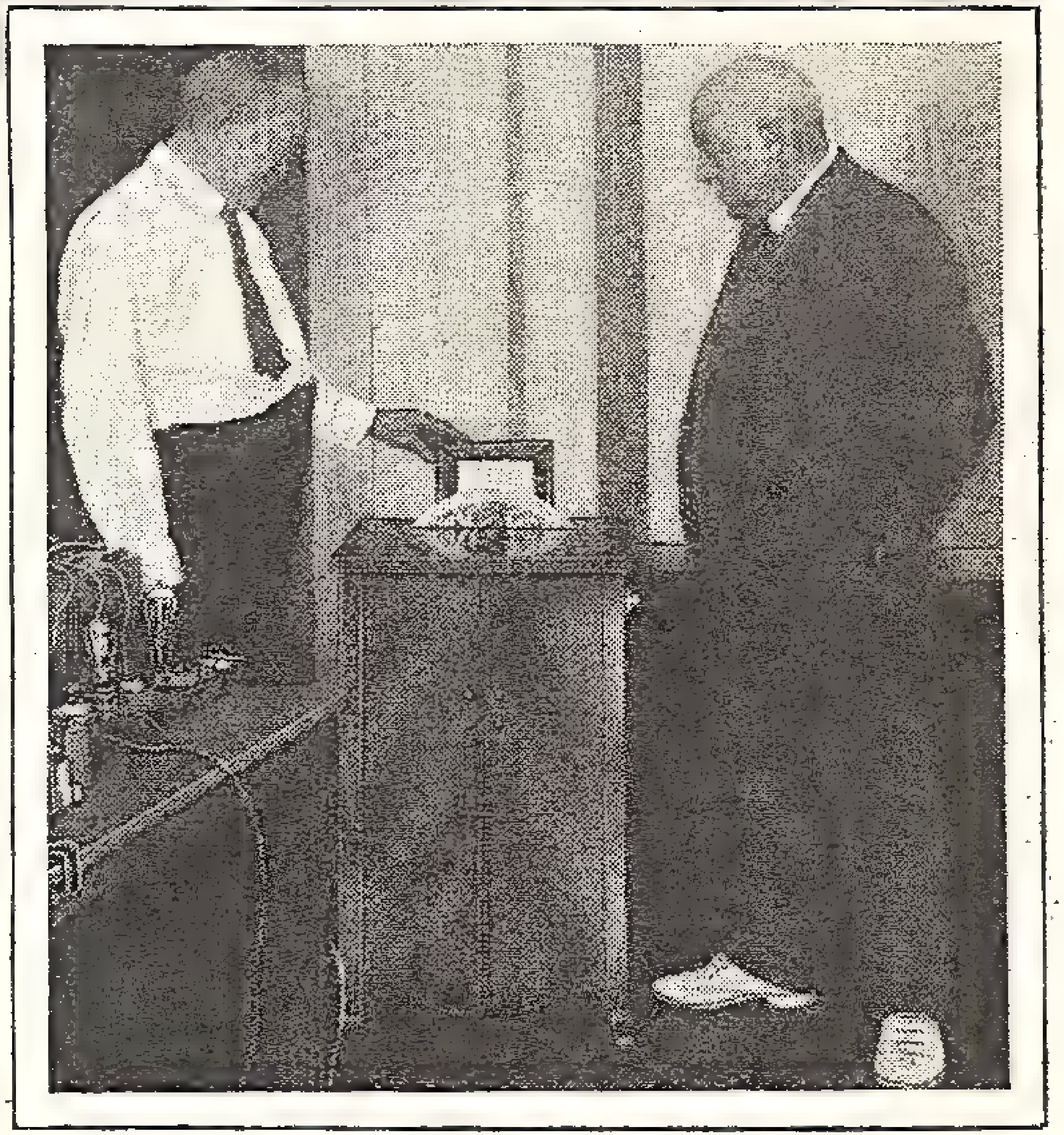
Too Much Nudism Is the Bunk

ARGUMENTS for last summer's fad of nudism based on the theory that the absence of clothes is good for health, are exploded editorially in the New York City medical periodical, *American Medicine*. Reasonable exposure of the skin to air, sunlight and the water of rivers or the sea has full medical support. Old-fashioned heavy and impervious clothing was condemned long before modern ideas of nudism were thought of. The point made by the medical editors is merely that it is not necessary to expose all of the body to air or sunlight or to expose it all of the time. The authorities are skeptical also of the moral and mental benefits claimed for nudism.

Scanning Method Brings Television Movies



Basic elements of the new Jenkins television system are seen here. The moving scene is built up in the chemically coated plate by the brushes on the scanning discs. The control plate acts as a slide in a magic lantern except that the scene is in motion. Pictures are clear as movie films.



C. Francis Jenkins, inventor of the revolutionary television receiving system, demonstrating a receiver developed by him.

THE progress of television has long been retarded by the lack of an efficient light source which could react instantaneously to the fluctuations of incoming radio currents and at the same time be powerful enough to project the image upon a large theatre screen.

This difficulty, however, has now been overcome by the development of a new scanning method which promises to equal or excel the movies as a source of home and public entertainment. This new method dispenses with the neon tube altogether and utilizes as a source of illumination the arc light of the conventional projector.

New "Control Plate" Is the Secret

The heart of the new system is a "picture frame," or "lantern slide," a small glass plate on which the actual moving scene being broadcast is created. This plate is covered on one side with a fine wire mesh impregnated with an electro-sensitive substance which renders the glass, normally opaque, transparent when an electric current is passed through it.

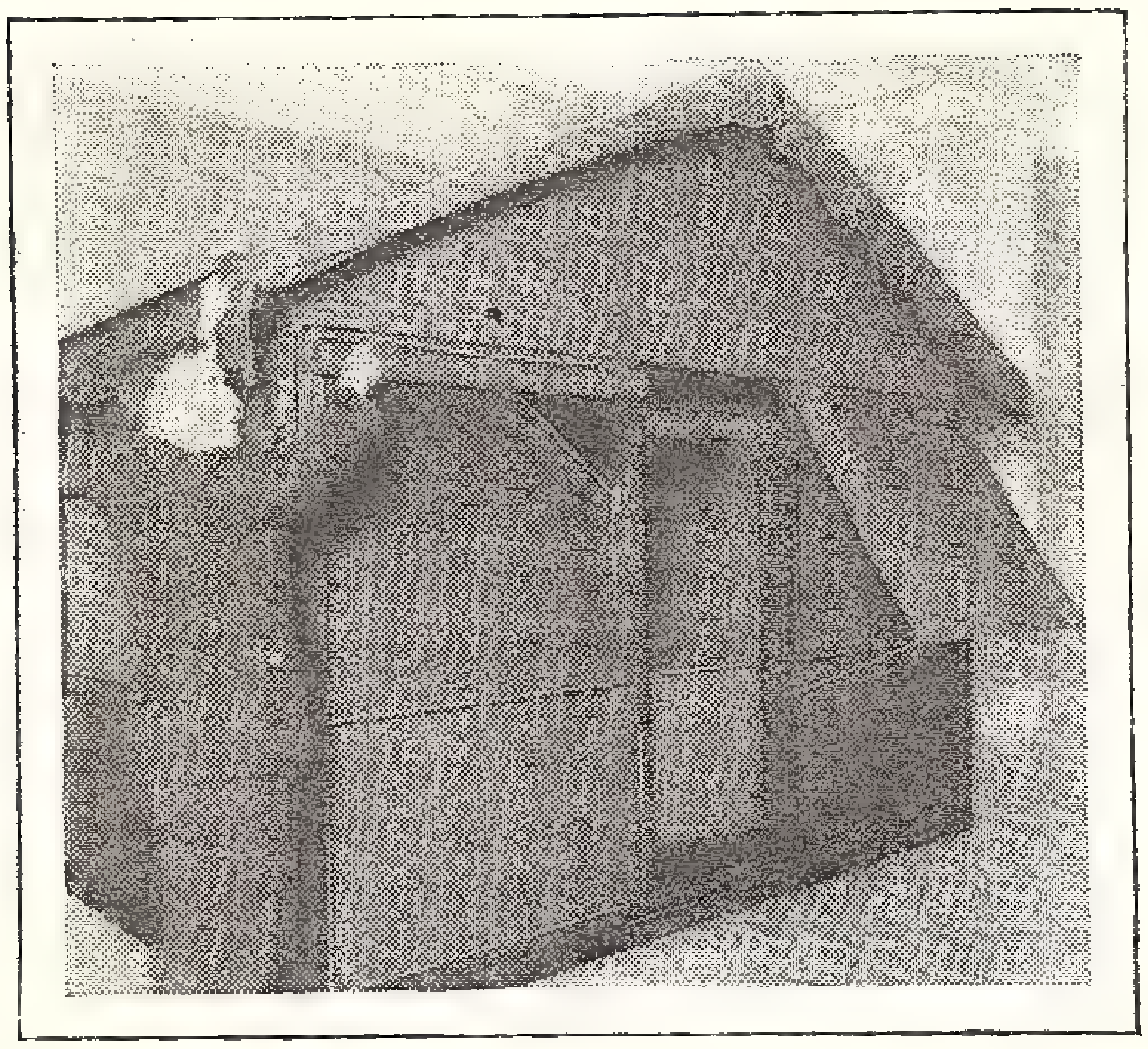
A scanning disc is used to provide the electrical disturbance necessary to render the plate transparent. This disc, shown in the artist's drawing above, is made of clear glass with 60 fine wires radiating out from the center like spokes from a wheel, each wire terminating in a tiny brush. These brushes are arranged in a spiral curve, similar to the holes in the metal scanning disc of the conventional television system.

Each brush is spaced from the next by a distance equal to the width of the chemically-coated glass plate. Then while the disc makes a single revolution, the sixty terminals sweep the plate one after the other, with 60 slightly curved parallel lines, each a short distance apart, until the plate is covered from top to bottom. The speed of the scanning disc is synchronized with the transmitter at the broadcasting station.

The chemical coating on the plate, under the influence of the electric current from the passing wire terminal of the disc, becomes transparent in a varying amount, according to the intensity of the incoming radio signals. With these 60 brushes sweeping the plate 15 times a second, the speed of the disc, a moving picture corresponding the scene at the transmitter is built up.

The light passed through the changing transparency of the control plate is projected upon the theatre screen just like any moving picture.

Sleep Outdoors With Home Comforts in New House Tent



This house tent affords utmost comfort to outdoor sleepers. Foremost are the roller blinds used for sun and rain. They cover all screening and may be regulated from within.

THE latest development in house tents brings to the user many novel features of home comfort. The tent roof as illustrated at the left is separated from the rest of the structure by a ten-inch partition of screening permitting wonderful ceiling ventilation. The upper half of all four walls are screened also, providing additional air circulation and protection against mosquitoes.

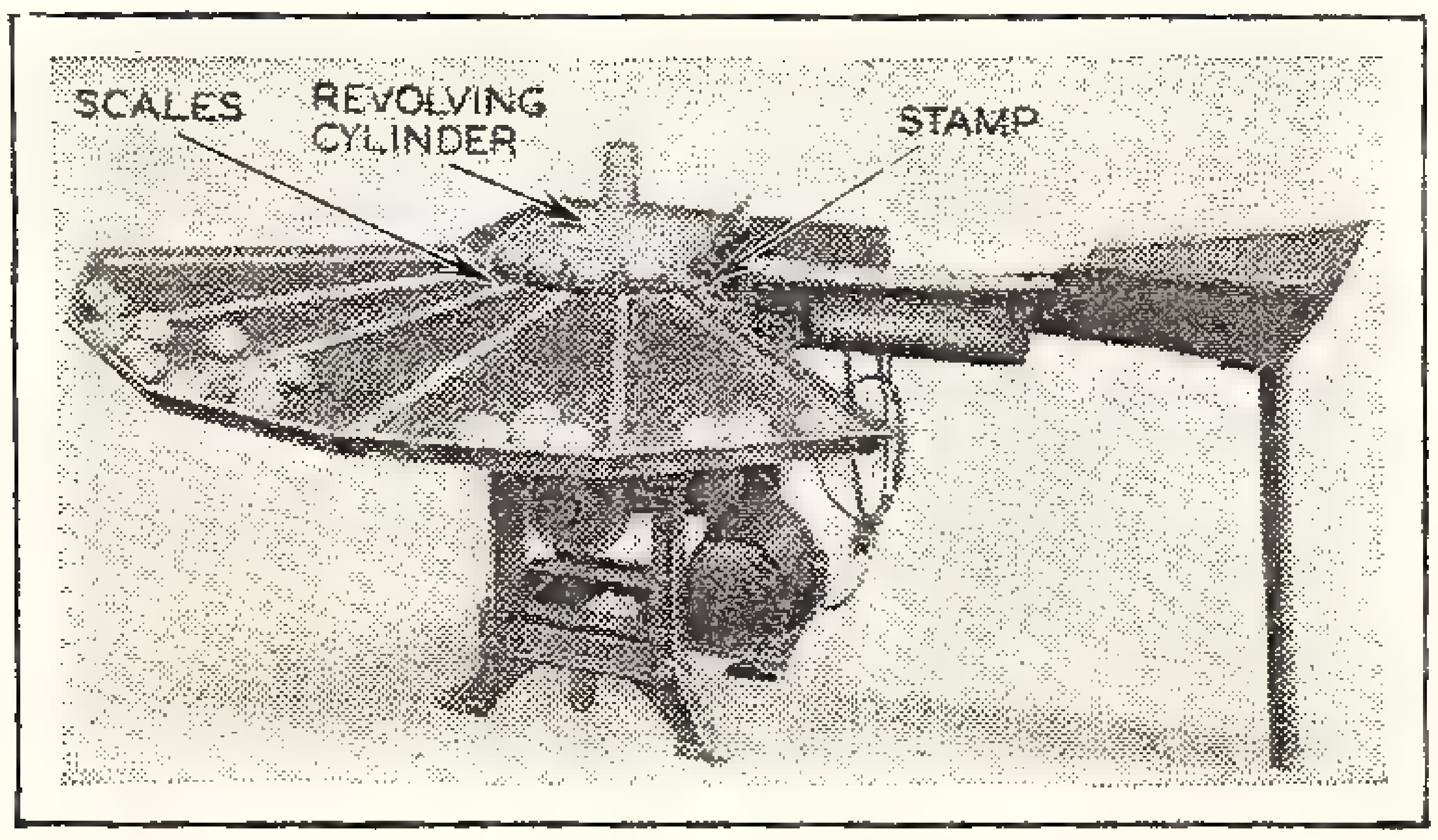
The screen windows and door have roller blinds attached. If you are awakened from a sound sleep by coldness, a rising high wind or a torrent of rain, all you need do is to release the blinds from inside the tent. They roll into place covering the screening. These same blinds may also serve as sun shades in the midst of a hot day.

Three Marks of True Nightmare

THERE are three significant characteristics of a true nightmare. One is an agonizing dread, probably a greater terror than any other kind of fear or horror, real or imaginary, ever experienced by human beings. A second is a feeling of being suffocated, as though an enormous weight were lying on one's chest. The third is a feeling of complete paralysis, not only affecting the muscles of legs and arms but making speech impossible. Unless a person feels all three of these definite sensations, he is only experiencing a bad dream.

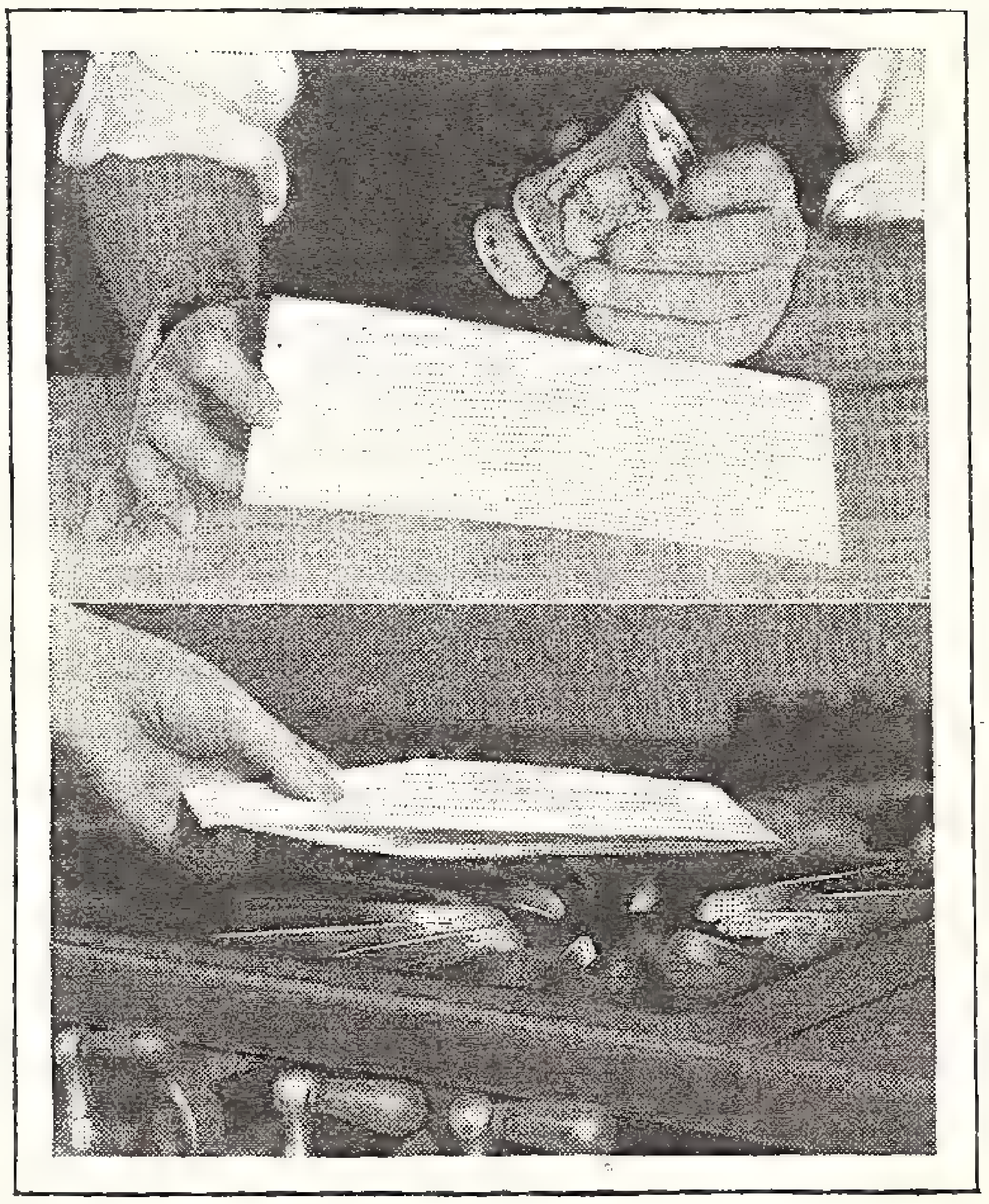
Machine Weighs and Marks Eggs

EGGS may be marked, weighed and assorted into weight groups by a new invention which has just been introduced in Germany. As the eggs pass through a slotted groove, they come in contact with a rotating, bell-shaped container. This leads them over balances where they are weighed. They next pass under a stamp which marks the weight, date and name of dealer; then on into compartments corresponding to each weight group.



Eggs are marked, weighed and separated into weight groups by this machine, which handles 60 eggs per minute.

How to Make Embossed Stationery



Resin is sprinkled on ink and held over flame to melt.

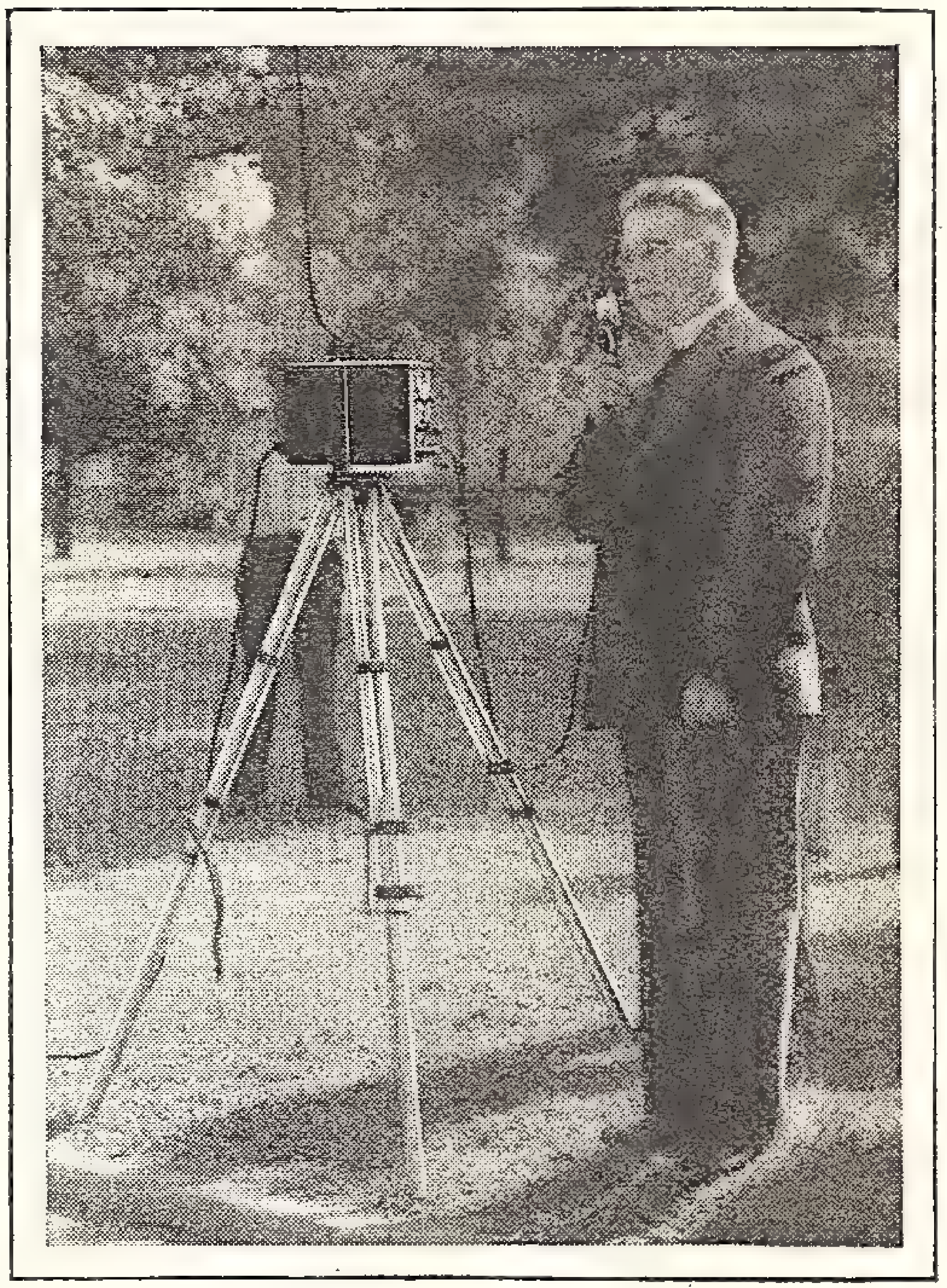
IMITATION engraved stationery, in which the printing stands above the surface of the paper in a gloss finish, can be made at home quite inexpensively with a rubber stamp outfit. The type is set up in the holder, and a pad made of several thicknesses of cloth to hold the ink. The latter is made of any color of regulation printing ink, thinned with wintergreen oil and smeared on the pad.

Ink the stamp on the special pad, and print up about a dozen sheets of the stationery. Then, with a salt shaker, sprinkle a small quantity of powdered resin over each, blowing off the surplus that does not adhere to the printing. To finish the sheets, hold them over a gas burner.

Two-way Radiophone for Duty in Riots, Fires and Cave-ins

FOR emergency mobile communications over short distances, a new portable radio transmitter and receiver known as the "transceiver" has been introduced. The last word in compactness the cabinet containing the station is mounted on a tripod as illustrated in the accompanying photo. For an aerial, all that is needed is a wire strung to a post, tree or wall near by. The total weight, including the batteries, is only 22 pounds.

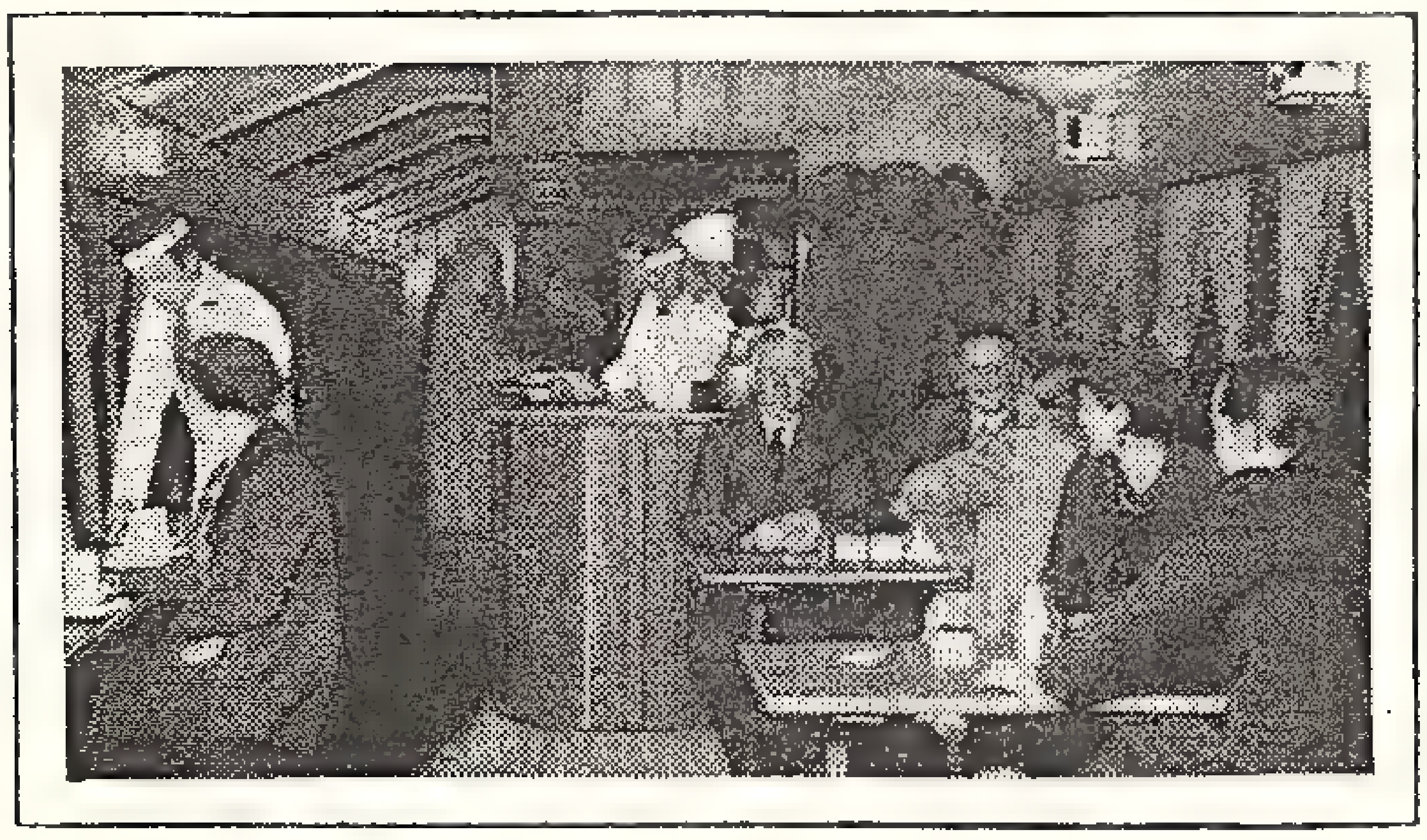
These "transceivers" are expected to find a ready use in police work where mobility and adaptability are especially important. In subway disasters and tunnel work these instruments will prove highly serviceable.



Here's the new "transceiver" set up ready for operation. Mounted on tripod, outfit weighs 22 lbs. and proves ideal for police work, fire fighting and tunnel disaster rescue jobs.

Eat Your Breakfast on the Train

FOR the benefit of those sleep lovers who can't get up in time to eat breakfast at home, a new stunt in perambulating dining rooms should prove a great boon. Going on a suggestion from a commuter, the New York, New Haven and Hartford Railroad has put in service between New Haven, Conn., and New York City, a cafeteria car which serves breakfast en route. The photo below shows the interior of the car, with a group of commuters partaking of the meal which they missed at home.



Commuters aboard New York, New Haven and Hartford cafeteria car partaking of breakfast which they missed at home. All trains will carry these cars if idea proves successful.

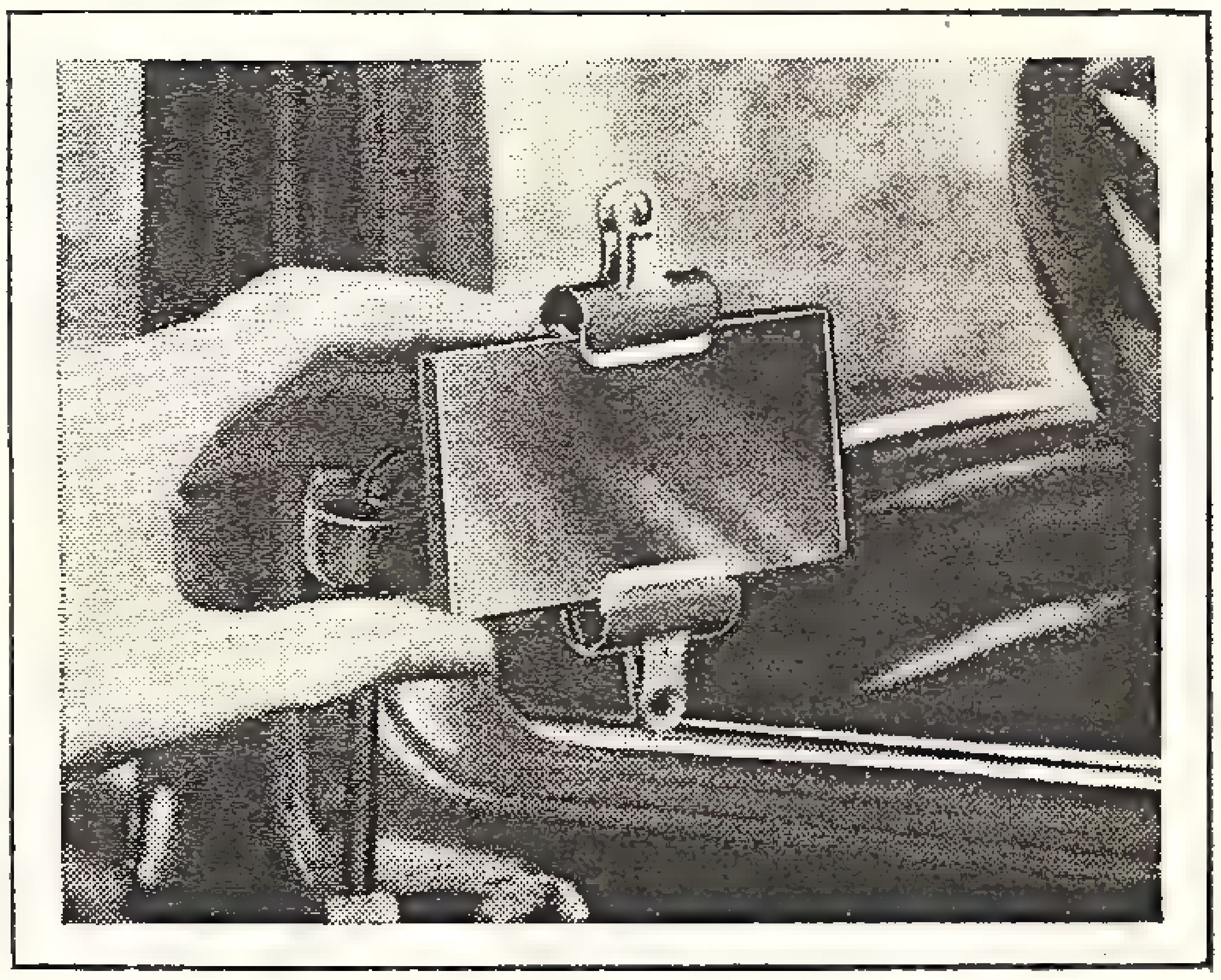
War Deaths Deepen Depression

ONE chief cause of the depression is admitted to be world-wide fear, lack of confidence and unwillingness to take even the slightest chance on the future. A new theory of why this despairing psychology exists at all was suggested recently in an address in London by Sir Ernest Benn, English publisher.

It is an inevitable result, he believes, of the fact that so many young Europeans were killed in the war, leaving world business to be directed largely by conservative and timid oldsters who normally would have given place long ago to younger and more courageous men. Most of the war deaths were of men between twenty and thirty, who now would have been between forty and fifty.

Easily Made Glareless Mirror

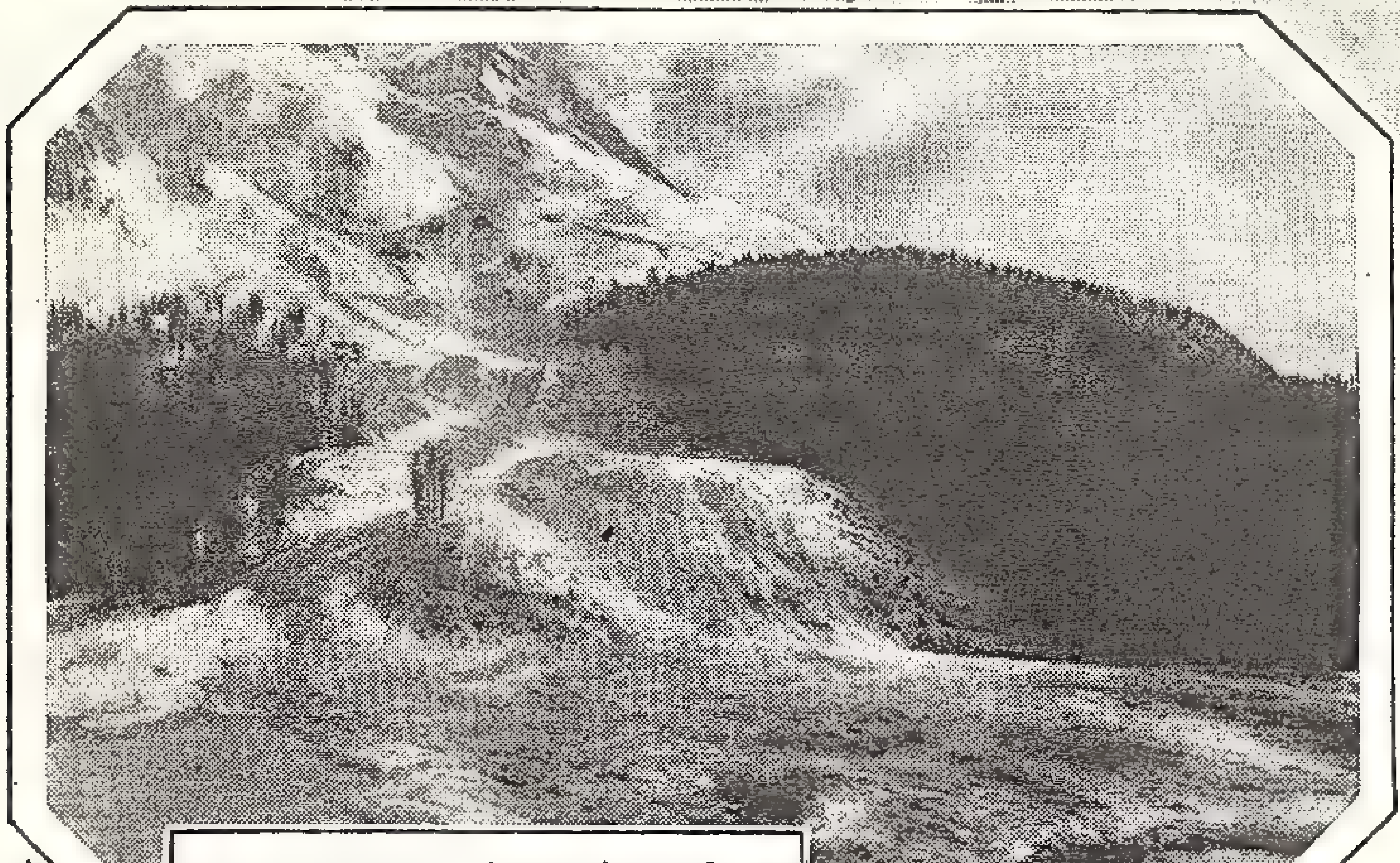
BLACK glass or ordinary glass painted black on one side will make a very useful glareless mirror for automobile drivers when driving at night. The glass should be cut to the approximate size of the rear-view mirror and secured there with a pair of paper clamps as shown in the illustration. Of course, this device is most valuable when the rear-view mirror is of the non-glareless type which reflects the headlights of following cars in the driver's eyes, blinding him.



Glass for glareless mirror is cut to size shown here and painted black on one side, secured in position with clips.

Engineering GENIUS Fights

The aftermath of a snowslide which occurred at Bingham, Utah, in February, 1926. Rescuers are seen digging out victims of the avalanche.



Striking photo above shows how an avalanche swept a path through a wood on the slope of a mountain.

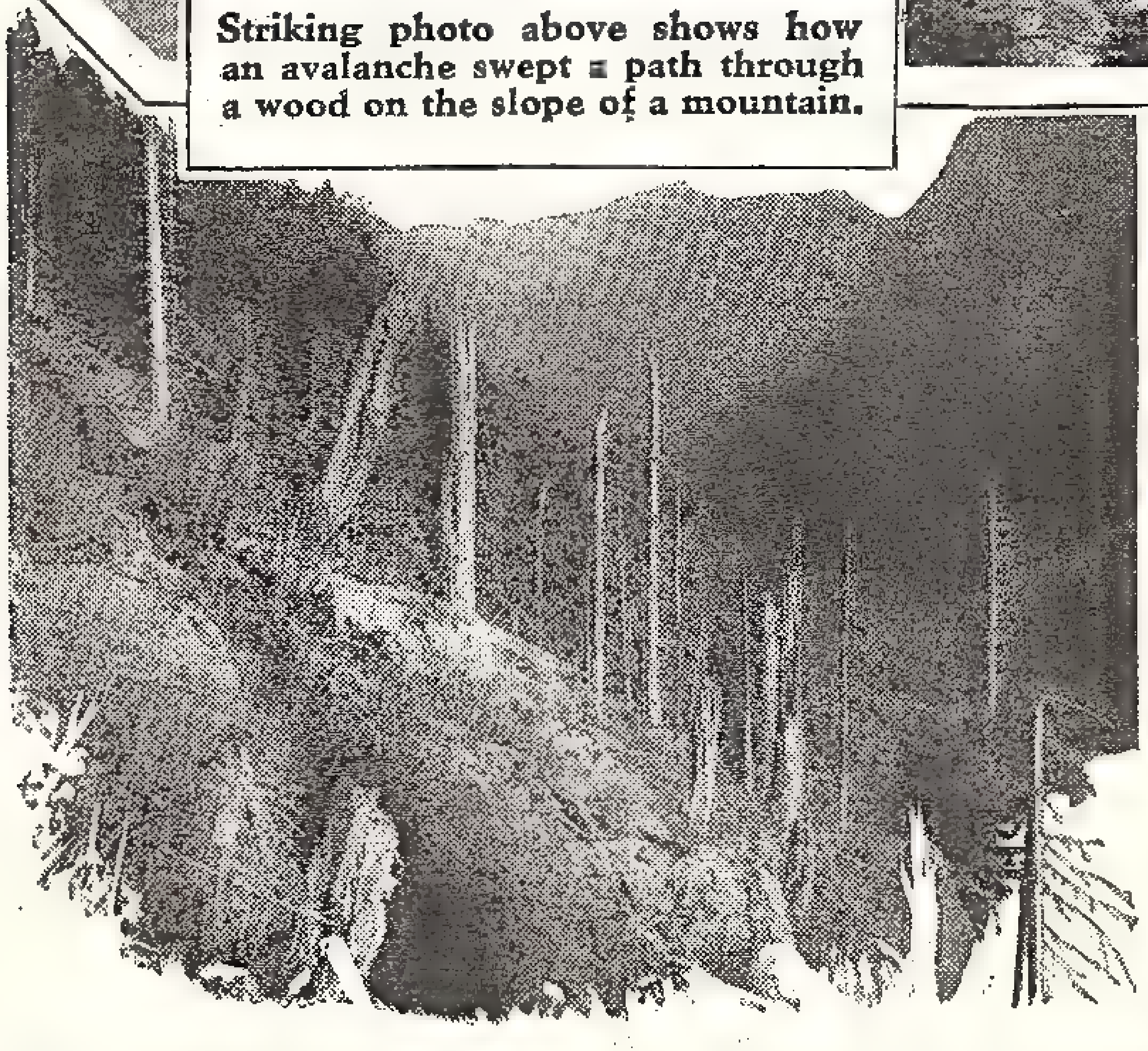
The avalanche, nature's most destructive monster, now submits to the intelligence of modern engineering genius, whose methods of control are explained here.

by CALVIN FRAZER

"SNOWSLIDE Hits Train; One Dead, Four Missing." "Colorado Snowslide Buries Four Miners." "Twenty-one Italian Soldiers Killed by Avalanches." "Thirteen Ski Tourists Perish in Avalanche."

These four headings were selected at random from a large collection of newspaper clippings, all of recent date, relating to disasters due to the terrific cataracts of snow that sweep down the steep slopes of mountains in all parts of the world; often with dire results, though fortunately the vast majority of these slides are harmless, either because they occur in unsettled regions or because various protective measures against them have been taken by mankind.

People who live in non-mountainous regions may think of the avalanche as a somewhat rare event. It is true that *destructive*



These denuded and splintered trees are part of the wreckage from an avalanche wind, generated by the displacement of air in the front of a snowslide. Such winds reach forces greater than hurricane. Entire villages have been devastated by avalanche winds, though untouched by snow.

the Destructive Avalanche

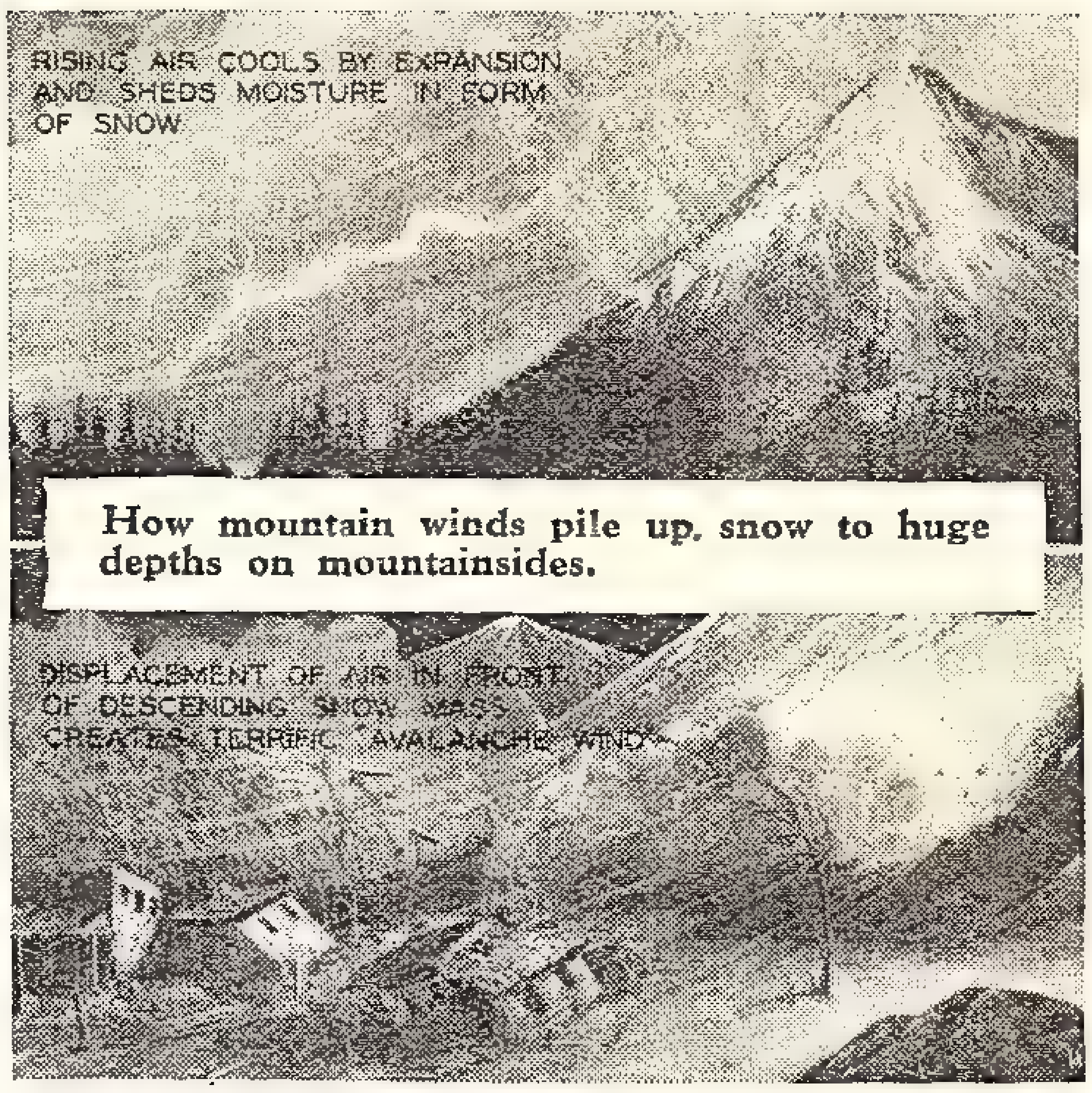
avalanches do not occur every day, but those that have no serious consequences and hence fail to get into the newspapers descend the mountains of the globe by the millions in the course of a year. It is easy to see why this must be so.

A mountain, because it projects up into the colder regions of the atmosphere and especially because it forces the winds that blow against it to rise, cool by expansion and shed their moisture, is a great collector of snow as compared with the surrounding plains. Of the snow thus gathered part is removed by evaporation, part melts and flows down as water, and part, gradually compacted into ice, creeps slowly down in the form of glaciers. Some is also blown from the peaks and higher slopes by the winds, but a vast amount remains to be removed by the speedier process of the snowslide or avalanche.

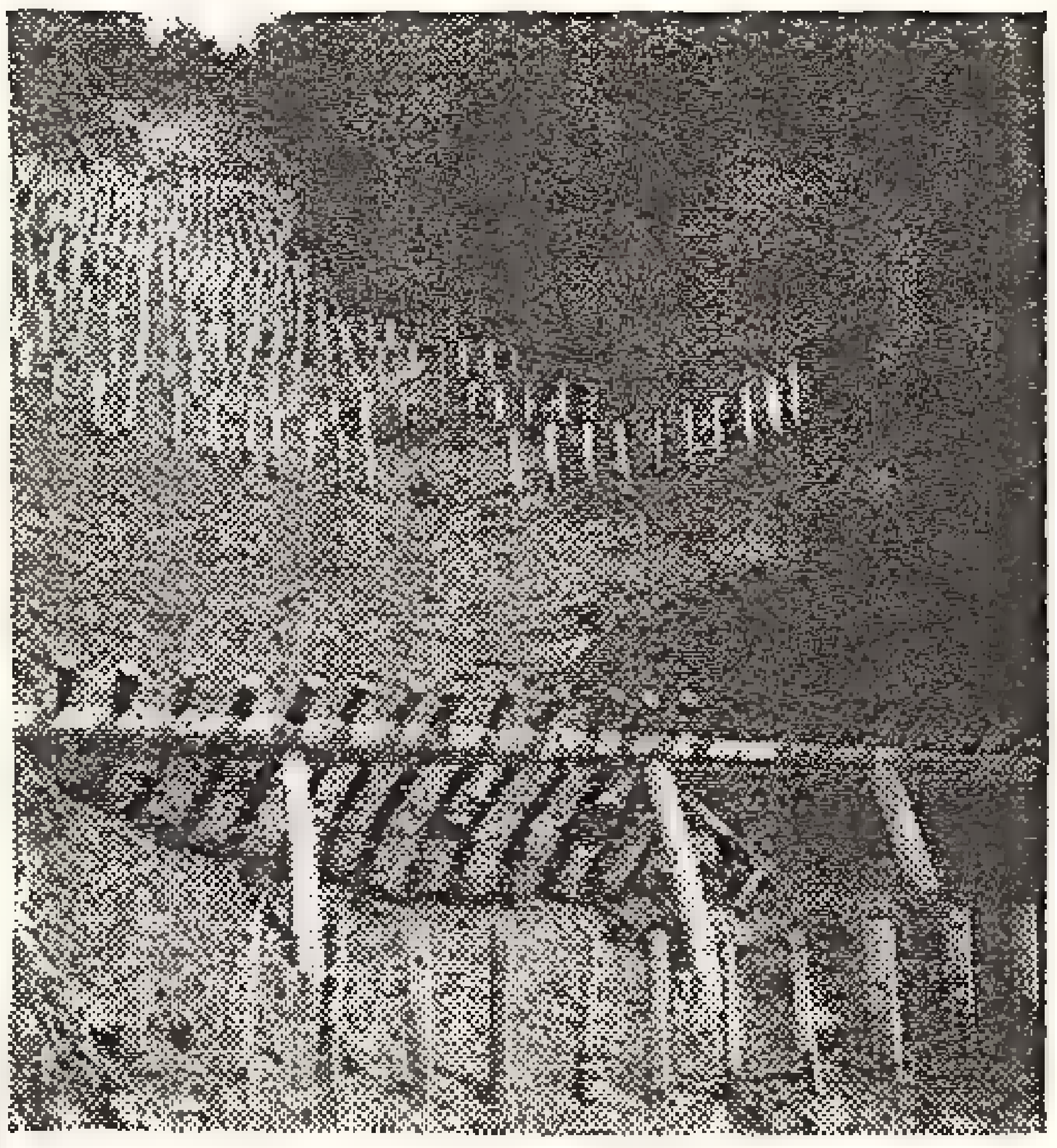
Roof Slide Is Small Avalanche

If you live in a snowy part of the country you will probably witness avalanches on a small scale this winter on sloping roofs in your vicinity. The snow may become saturated with water until, no longer able to adhere to the shingles beneath, it slides off and thuds to the ground, or again, in colder weather, it may remain dry but eventually accumulate in such quantities that some slight jar will start it down.

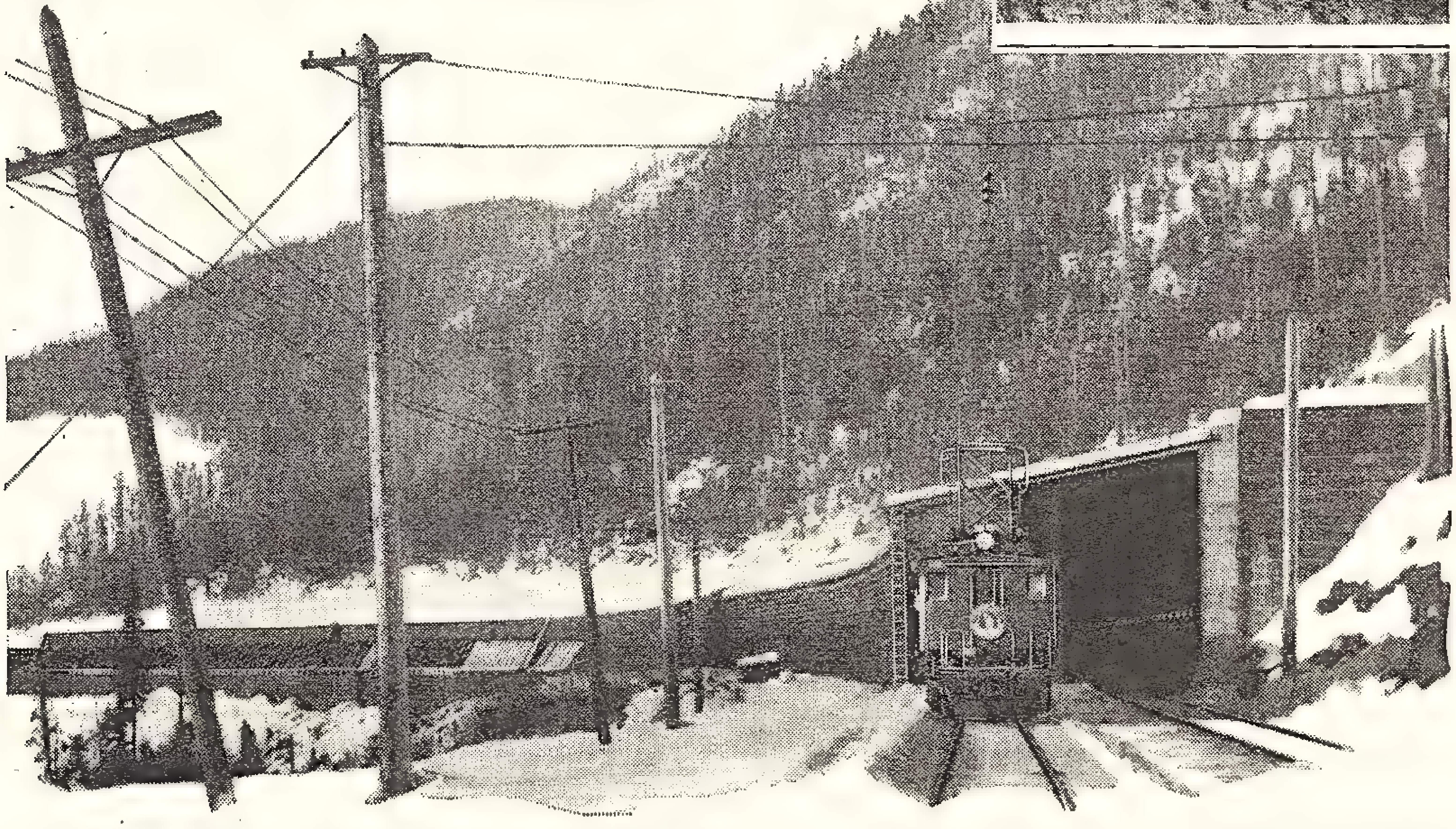
The same two varieties of avalanche occur in mountains. The former is called a "ground" avalanche, and is commonest in spring; the latter, known as a "dust" avalanche, is confined mostly to winter and consists of dry, powdery snow, great clouds


RISING AIR COOLS BY EXPANSION AND SHEDS MOISTURE IN FORM OF SNOW
DISPLACEMENT OF AIR IN FRONT OF DESCENDING SNOW MASS CREATES TERRIFIC AVALANCHE WIND

How mountain winds pile up snow to huge depths on mountainsides.



Drawing above shows how terrific avalanche winds are created. In Switzerland, a mountainous country, elaborate precautions must be taken to guard against avalanche disasters. Photo at right shows rows of stakes driven into the ground to break up and retard snowslides.



On mountain railroads both in Europe and America, tunnels and snowsheds such as the one shown above furnish a partial protection from the unstable snowfields. Avalanches descend upon roof, leaving tracks clear for fast trains. Construction of sheds must be substantial and bracing secure to withstand the crushing fury of thousands of tons of snow.

Barriers Built of Stakes and Stone Walls Check Avalanche Movements

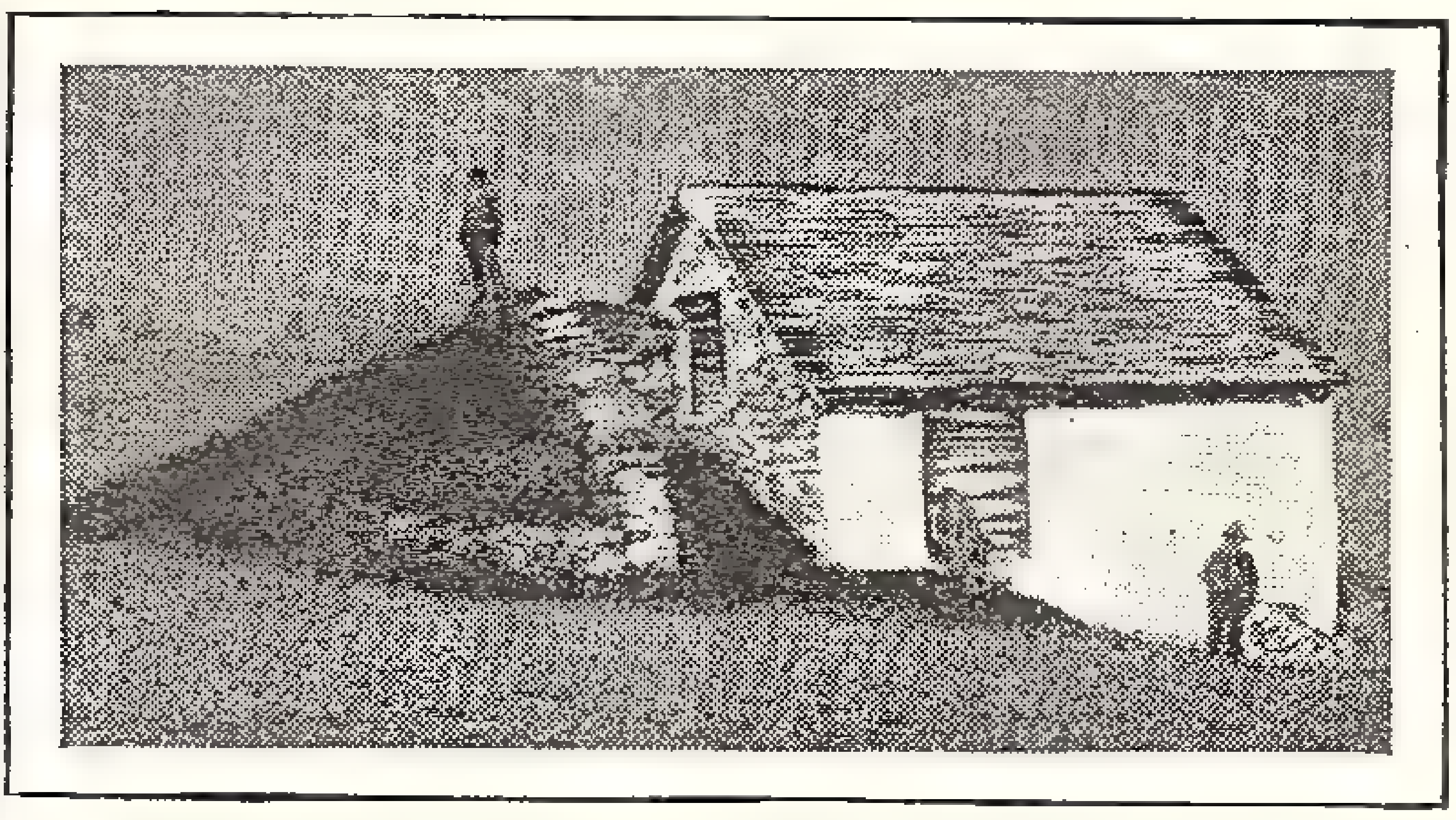
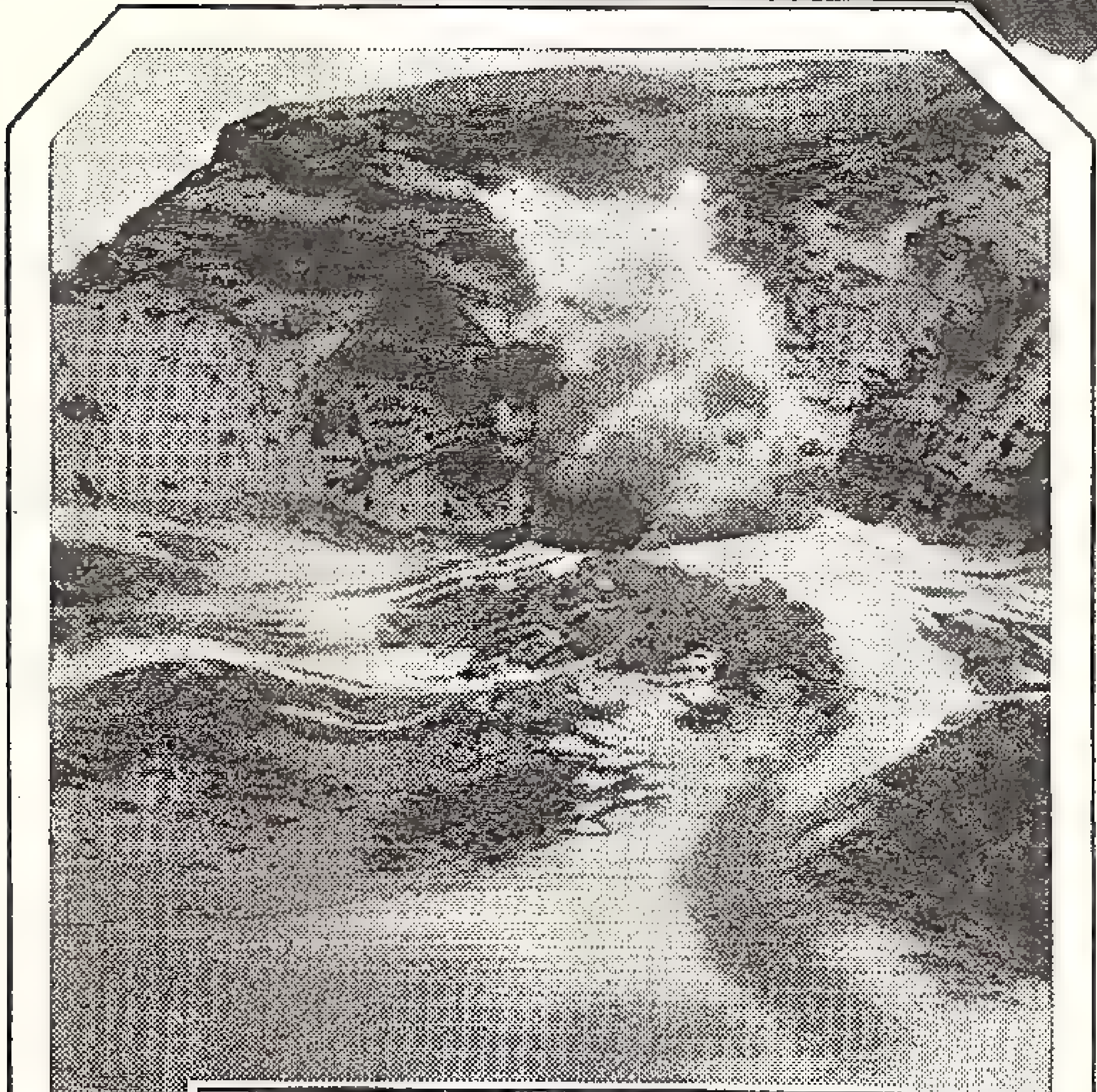
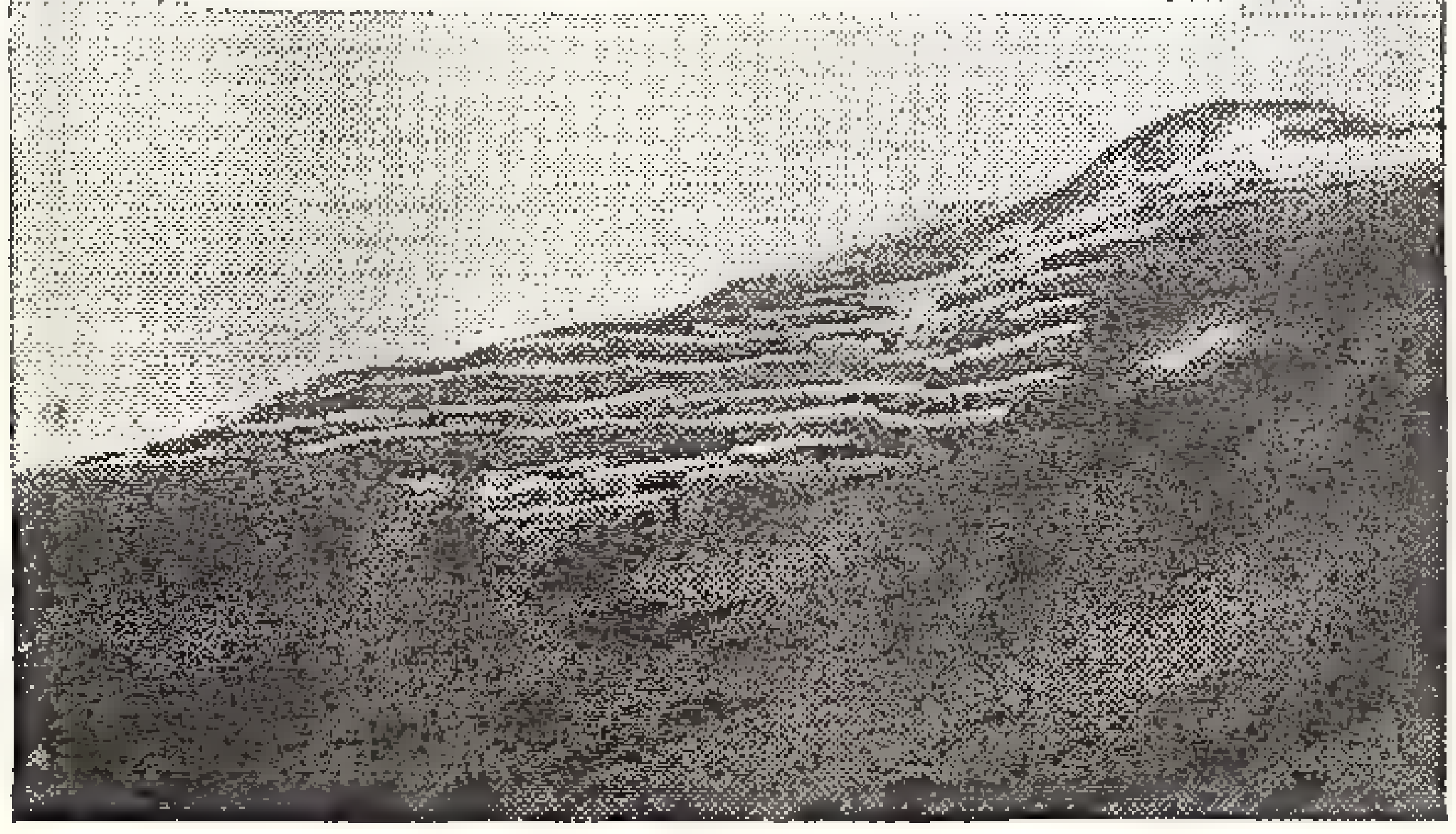


Photo above shows how Alpine inhabitants build wedge-shaped stone walls for protection against disastrous slides.

Overhanging masses of snow endanger automobile traffic in mountainous countries. Above workmen are shown shoveling snowslide accumulation off Mt. Evans highway near Denver after blasting with dynamite.



Remarkable photo shows snow sliding down Mount Rainier, Washington. Mass of snow started down the 4000 foot cliff in background.



To check movement of sliding snow and to protect village at foot of mountain, engineers built these stone barriers.

of which fill the air as the mass sweeps down from aloft. In either case the amount of snow set in motion is often enormous. In the Alps, for example, one authority estimates that the average moving mass of an avalanche is something like half a million tons.

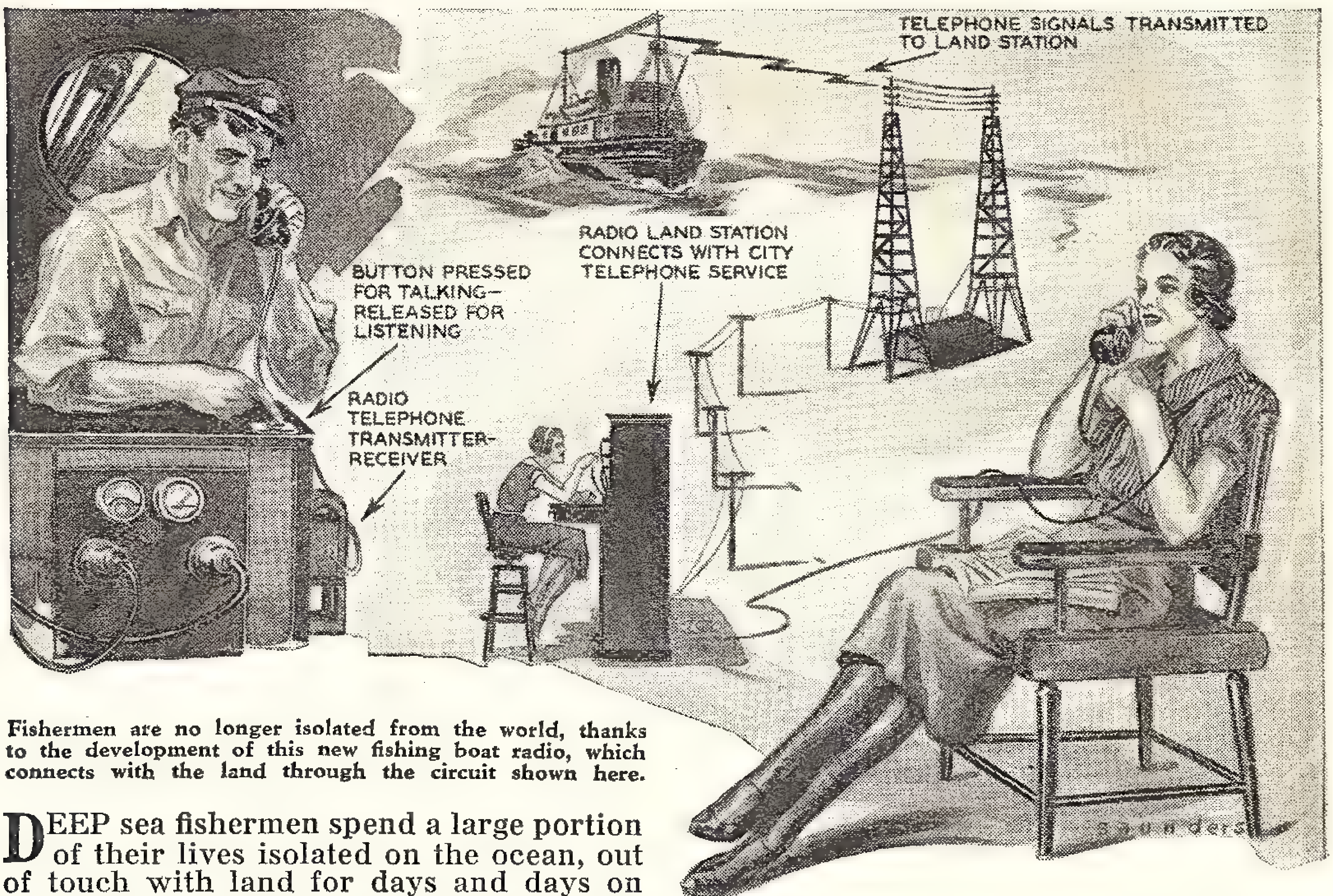
The descent of such huge masses of snow would, of itself, account for the remarkable feats of destruction accomplished by avalanches, but another destructive agency involved in these events is the "avalanche wind," due to the sudden displacement of air in front of the descending mass. The air thus displaced rushes not only straight forward but also on either side, uprooting trees and causing other striking physical effects far beyond the area covered by the avalanche itself. The avalanche wind is probably not exceeded in fury by any other natural blast on earth, tornadoes included. Alpine villages have been devastated by this wind though untouched by the descending snow.

Safeguards Against the Menace

Against avalanches, as against windstorms, earthquakes and most other destructive phenomena of nature, the ingenuity of man has gradually devised a number of safeguards; especially in the Alps, where methods of protection against avalanches constitute a highly specialized branch of engineering. In Switzerland warnings of weather conditions favoring

(Continued on page 144)

Fishermen Now Radiophone to Families


TELEPHONE SIGNALS TRANSMITTED TO LAND STATION
RADIO LAND STATION CONNECTS WITH CITY TELEPHONE SERVICE
BUTTON PRESSED FOR TALKING—RELEASED FOR LISTENING
RADIO TELEPHONE TRANSMITTER-RECEIVER
Saunders

Fishermen are no longer isolated from the world, thanks to the development of this new fishing boat radio, which connects with the land through the circuit shown here.

DEEP sea fishermen spend a large portion of their lives isolated on the ocean, out of touch with land for days and days on end. A new two way radio telephone, especially designed, for installation in fishing boats has now broken down this barrier of space, permitting the sailors to speak to their friends and families ashore.

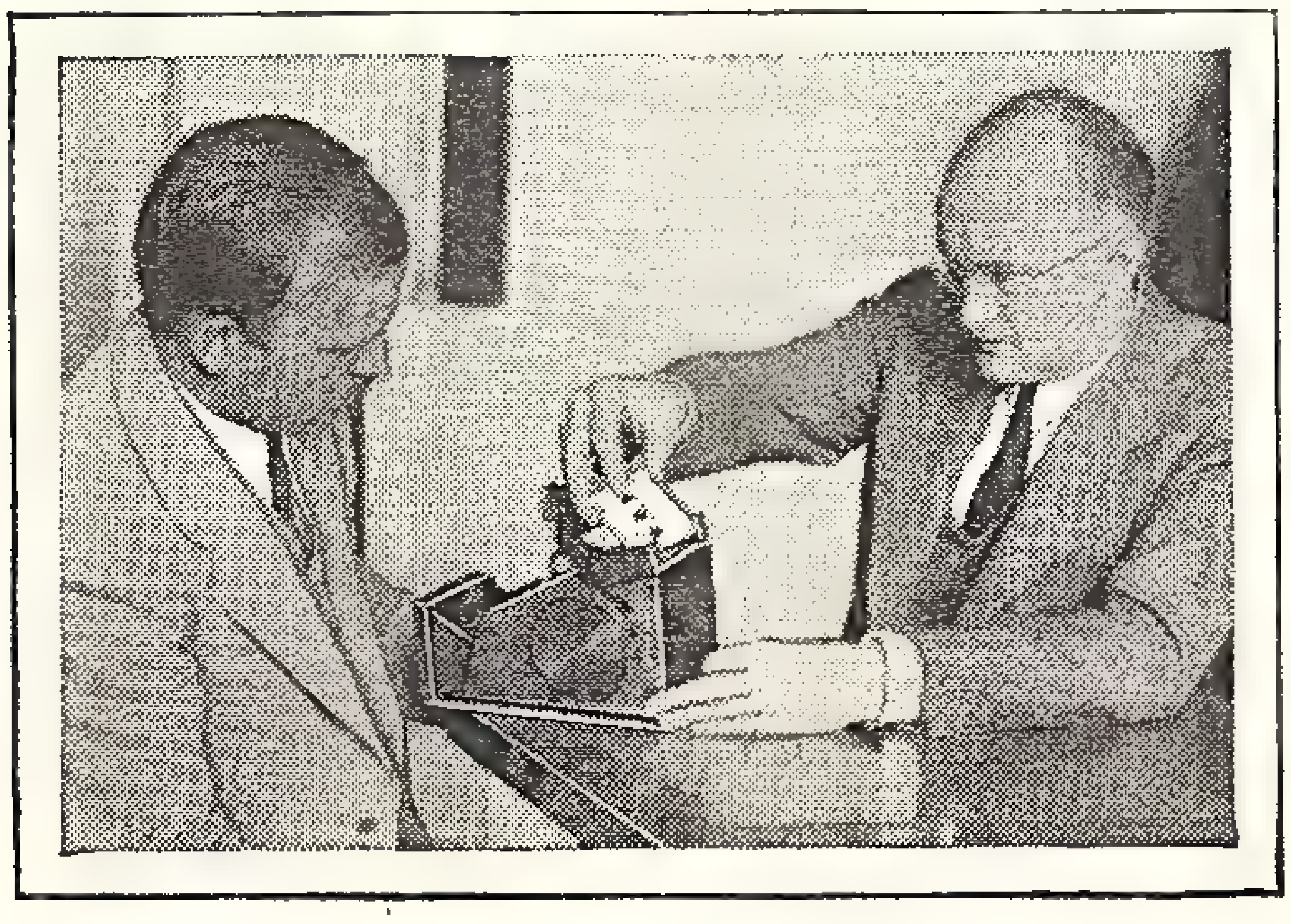
How the combined receiver and transmitter operates is illustrated in the artist's drawing above. No trained radio man is necessary to put through a call. The fisherman simply presses a button and connects up with a land station, which hooks him up to the city telephone system. Engineers are planning on installing many of these instruments on American fishing boats cruising the East coast areas.

Germs Found With Triple Nature

A GERM that can change into at least three different shapes, causing serious human disease in all of them and puzzling the bacteriologists who have been looking for three entirely different germs, is described by the United States Public Health Service.

Some of these germ buds seem to be so small that they are entirely invisible, apparently forming the third form of the germ and probably explaining many otherwise mysterious cases of human infection. The quick-change germ was obtained from the blood of sleeping sickness victim.

New Machine Shuffles, Deals Bridge Hands Automatically in One Second



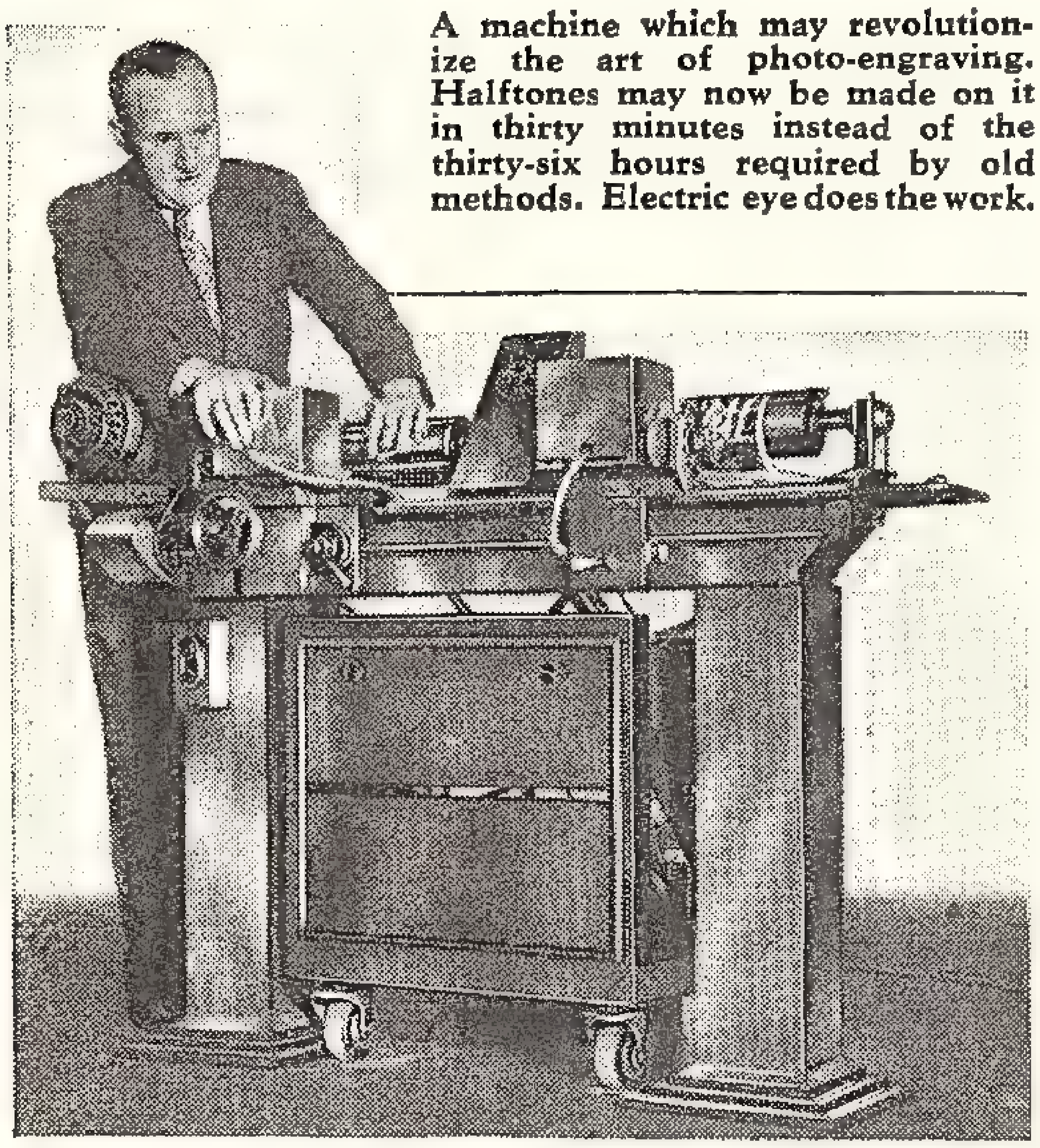
When deck of cards are inserted in this new shuffling machine, the deck is dealt out at four hands in a second.

INSTRUCTORS of Electrical engineering at the Massachusetts Institute of Technology have invented a new card dealing and shuffling machine which will take a pack of cards, shuffle them, and deal them out at the rate of four hands in one second.

The machine, shown in the photo at the left, stands only six inches high and weighs less than two pounds. The machine runs by electricity and is automatic, in that it starts as soon as the cards are inserted in the dealing slot and stops when the dealing is completed.

The inventors are shown with their creation in the photo. At left is Edwin L. Rose, at the right Prof. L. F. Woodruff, both of the electrical engineering department of the Institute.

New Engraving Machine Makes 3-color Cuts in Half Hour


A machine which may revolutionize the art of photo-engraving. Halftones may now be made on it in thirty minutes instead of the thirty-six hours required by old methods. Electric eye does the work.

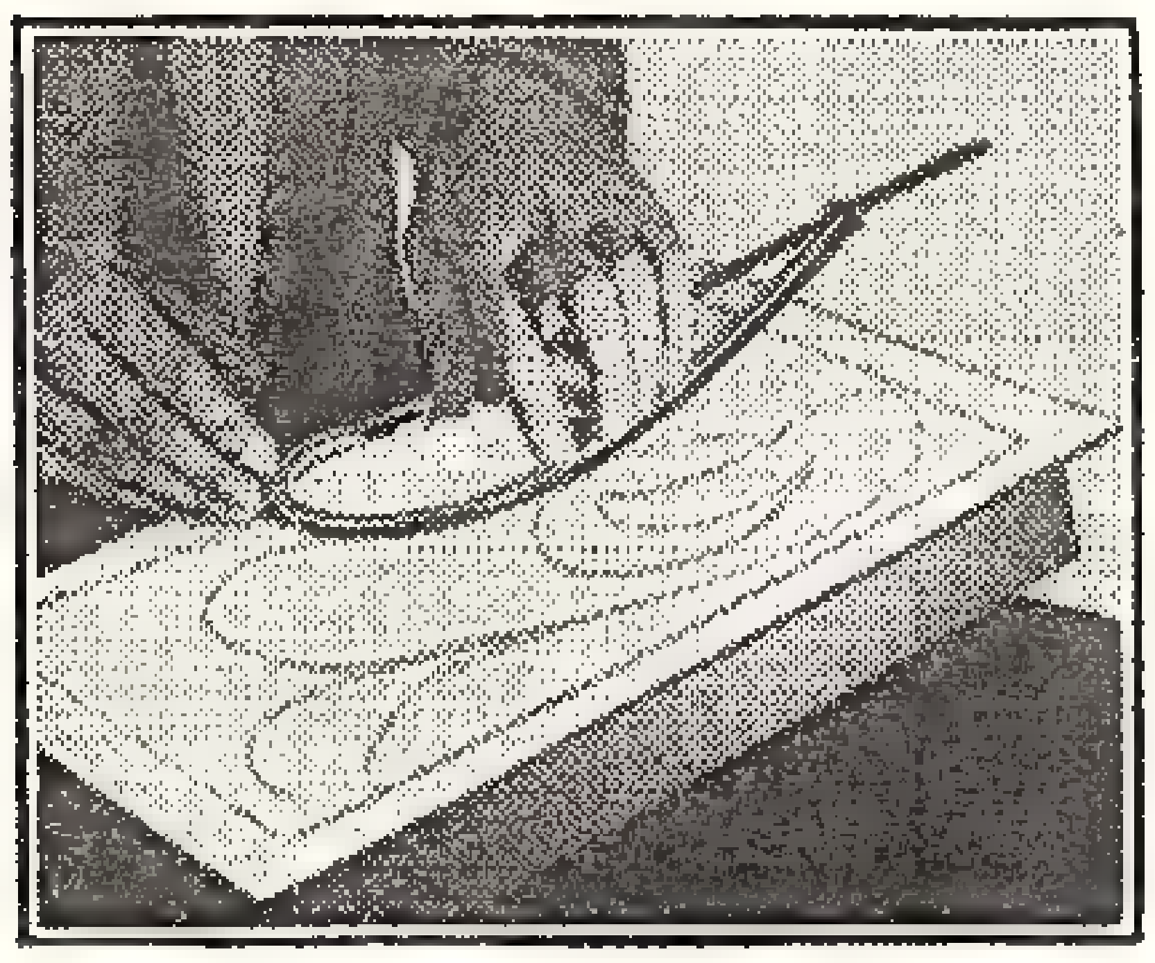
THE latest wonder of the electrical age is an automatic photo-electric color engraving machine. Shown in accompanying photo, the device is destined, inventors claim, to revolutionize the art of photo-engraving and its associated industries.

The machine is able to scan rapidly by means of an "electric eye" a photograph or painting in color and to engrave automatically in zinc sheets, "cuts" in three colors. The entire process takes less than thirty minutes instead of the thirty-six hours required by previous methods.

The photograph to be reproduced is mounted on a revolving cylinder which passes it in front of the electric eye, upon which impinges a brilliantly concentrated spot of panchromatic light thrown from two lamps. The faint electrical impulses set up by the electric eye, averaging a ten-millionth of a watt, are amplified up to a third of a horsepower to operate a sharp engraving tool.

Device Forms Irregular Curves

A NEW irregular curve instrument now being marketed is a great aid to draftsmen, artists and mechanics. They need no longer depend upon fixed curves that seldom contain the curve needed, or adjustable curves that require skill and patience. The device automatically forms perfect irregular curves by simply adjusting a slide. It may be reversed to form opposite curves or, turned end for end, form "S" or "OG" curves. The steel drawing edge is backed by a strip of rubber that acts as a rest for the fingers and grips the paper when drawing.

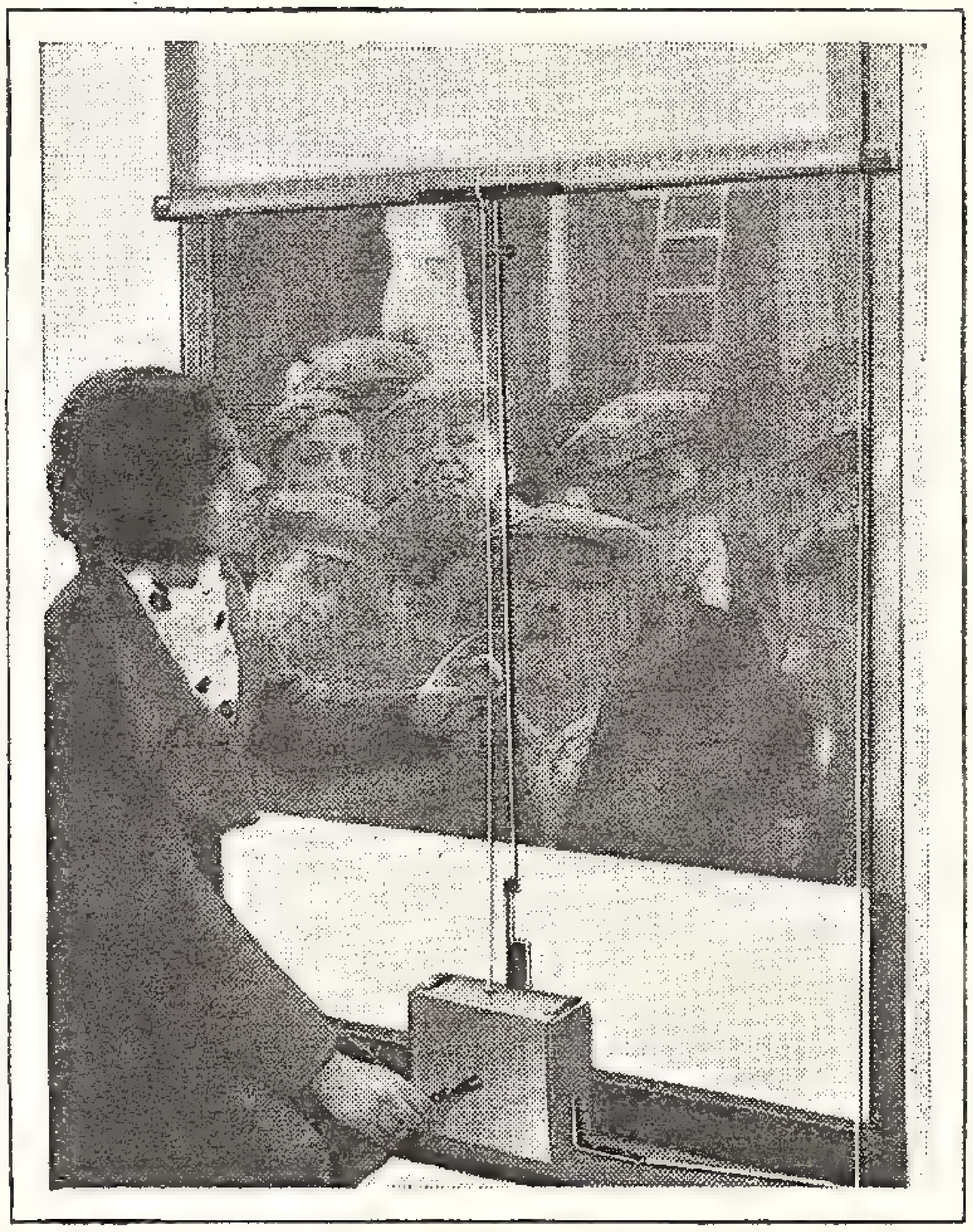

The irregular curve, shown in this photo, forms perfect curves by simply adjusting a slide. May be reversed to form opposite curves.

Rubber Used in "Acidseal" Paints

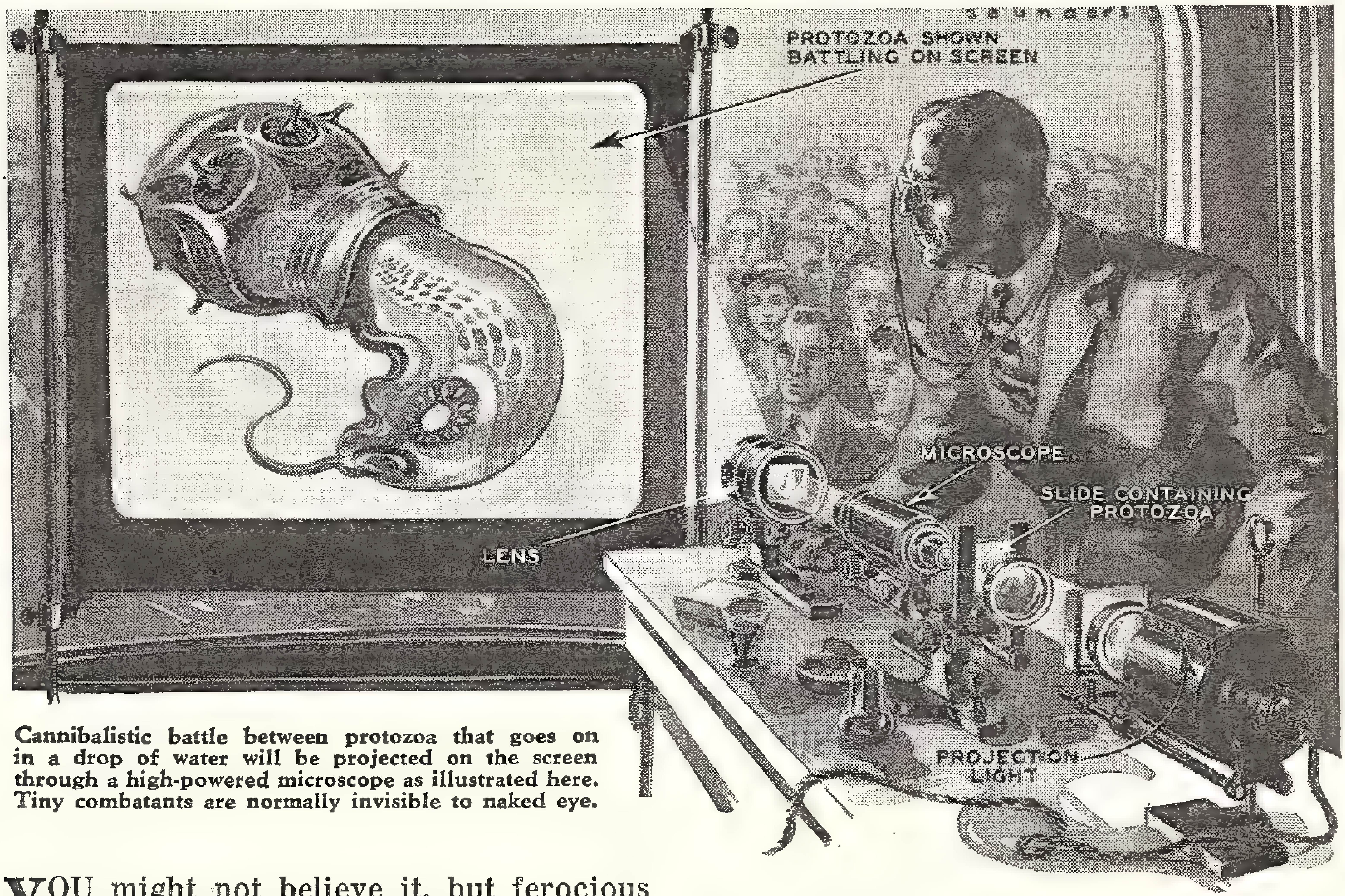
A NEW line of rubber paints now on the market have as a base a commercial form of rubber isomer which imparts valuable properties not found in ordinary paint films. They have the following advantages: (1) Exceptional properties of adhesion. (2) They dry in one hour to a hard, firm film but retain to a remarkable degree the elastic properties of rubber and consequently conform to the expansion and contraction of the support. (3) They provide a protective coating that minimizes the corrosive action of acids, alkalies and chemical fumes.

Anti-bandit Blind Foils Robbers

FOR protection against robberies, an anti-bandit blind has been designed to prevent smash-and-grab raiders from entering jewelers' and furriers' shop windows. The blind, shown in the photo below, automatically closes with terrific speed if the display window is touched by any object likely to break it. Once closed, the blind is exceedingly hard to break through. An alarm bell attached to the device rings furiously once the window is tampered with.


Display windows equipped with this automatic anti-bandit blind are safe from smash-and-grab raiders. If window is touched by any object likely to break it, the blind closes.

Screening Fierce Battle in Drop of Water



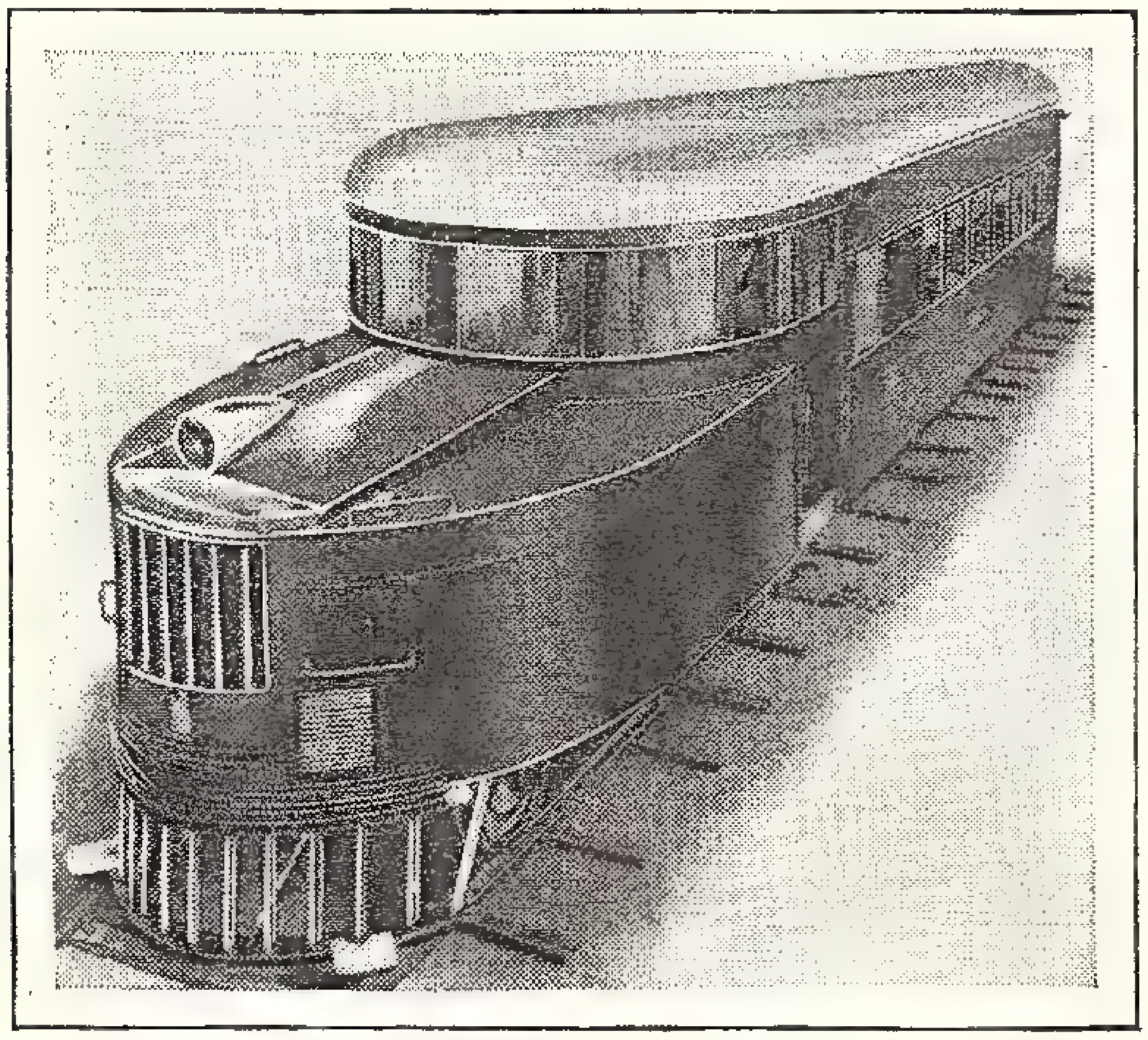
Cannibalistic battle between protozoa that goes on in a drop of water will be projected on the screen through a high-powered microscope as illustrated here. Tiny combatants are normally invisible to naked eye.

YOU might not believe it, but ferocious and cannibalistic battles are staged every moment of the day in the drops of water that make up the rivers, lakes and oceans of the world.

A few of these battles are to be brought to the screen for the amusement and amazement of visitors to the Hall of Science at the 1933 World's Fair. What will make this feat possible is a special projector which throws on the screen in a greatly magnified scale what is seen at the eyepiece of a powerful microscope.

Drops of water containing various species of unfriendly protozoa will be joined on the slide under the microscope connected with the projector. The battle to the death will be primitive and unmerciful, for protozoa are hungry and they ask no quarter and give no quarter. The artist's drawing above shows how the projector and screen will be rigged up for the show.

Streamlined Car Aids Railroads With Cheapest, Safest Transportation



Torpedo-shaped bullet car which will solve rail troubles.

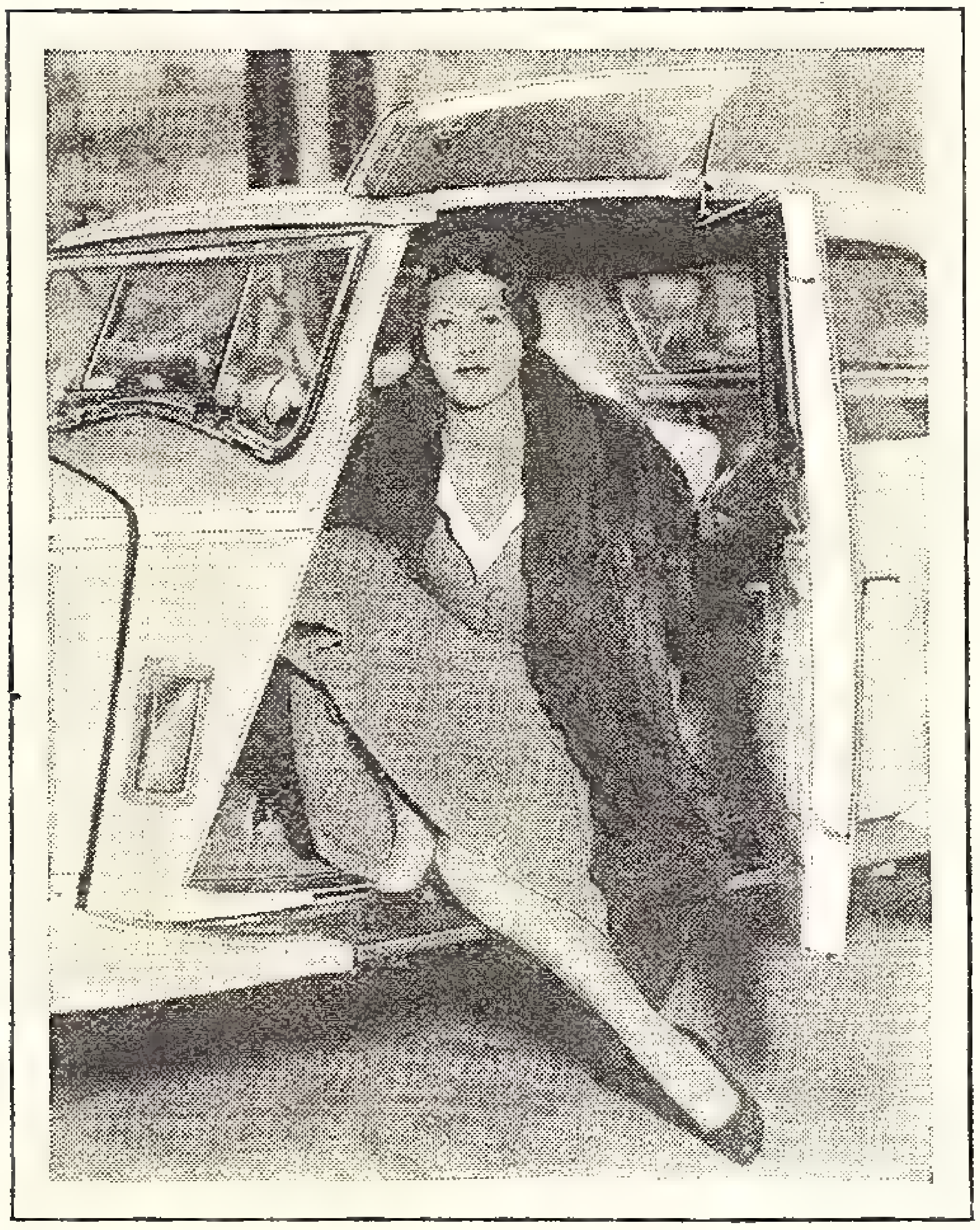
THE long awaited first step in the solution of the perplexing problem that now confronts the nation's railroads is promised by the sponsors of a new torpedo-shaped vehicle recently introduced.

The car, shown in the photo at the left, is said to offer cheap, regular and safe transportation on all main lines. It is approximately 60 feet long, seats 42 passengers, and is capable of a speed of 70 miles per hour.

The "autotram," as it is called, has a fully streamlined body, with a round bow and a wedge-shaped stern. The entire passenger compartment is insulated and sealed against heat, cold, dust and noise, all ventilation being provided by means of special air conditioning system which changes the air every three minutes.

The car is the product of the Clark Equipment Co., at Battle Creek, Michigan.

Automatic Trap Door in Car Roof Prevents Head Bumps



This new British made auto is equipped with automatic trap door in the roof to prevent bumping the head. The hinged part swings upward with opening of car door.

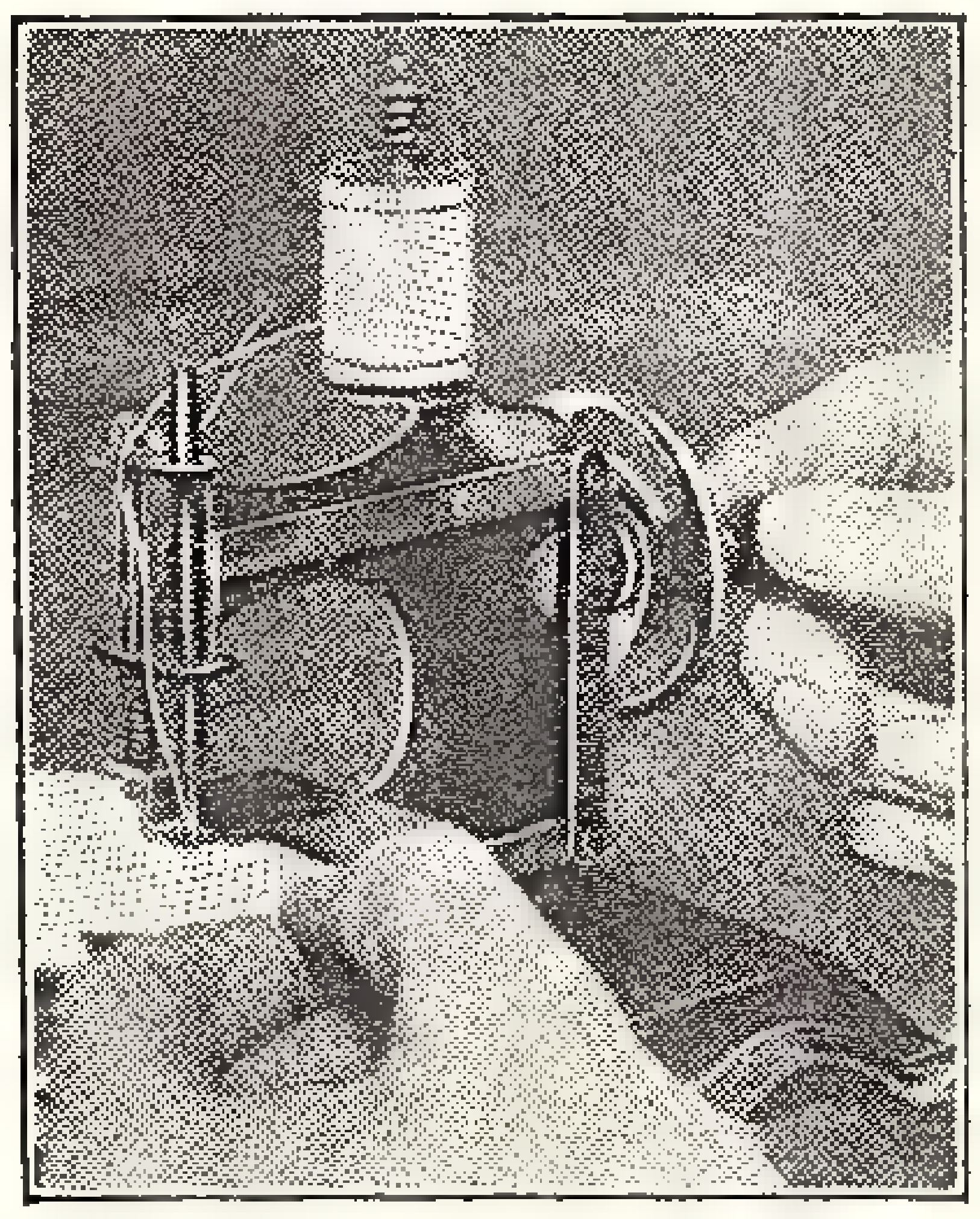
HAVE you ever bumped your head while getting into or out of an automobile? If so, you undoubtedly will be greatly interested in a recent invention coming from England.

The Riley Lincook cars so popular in Britain, are now equipped with automatic trap doors in their roofs, as shown in the photo on the right. The part of the roof frequently bumped by heads has an arrangement similar to a hinge. When automobile door swings open, hinged part of roof is thrust upward to a vertical position permitting driver to leave the car without striking the edge of the roof.

As door is shut, the device is lowered into place. Such an arrangement is especially valuable in a car built close to the ground. An automobile of this type is rather hard to get into and out of due to the necessity of bending down.

Hand Works Tiny Sewing Machine

A TINY sewing machine which really works exceedingly well is now being marketed by a Bridgeport, Connecticut, firm. It operates almost exactly like the larger type and comes equipped with a clamp by which it may be conveniently attached to any table. The power is supplied by a hand wheel, as shown in the accompanying photo. It can't be beaten as a toy for little girls. They receive much pleasure as well as plenty of worth while experience.



Tiny sewing machine, above, is powered by hand turning wheel.

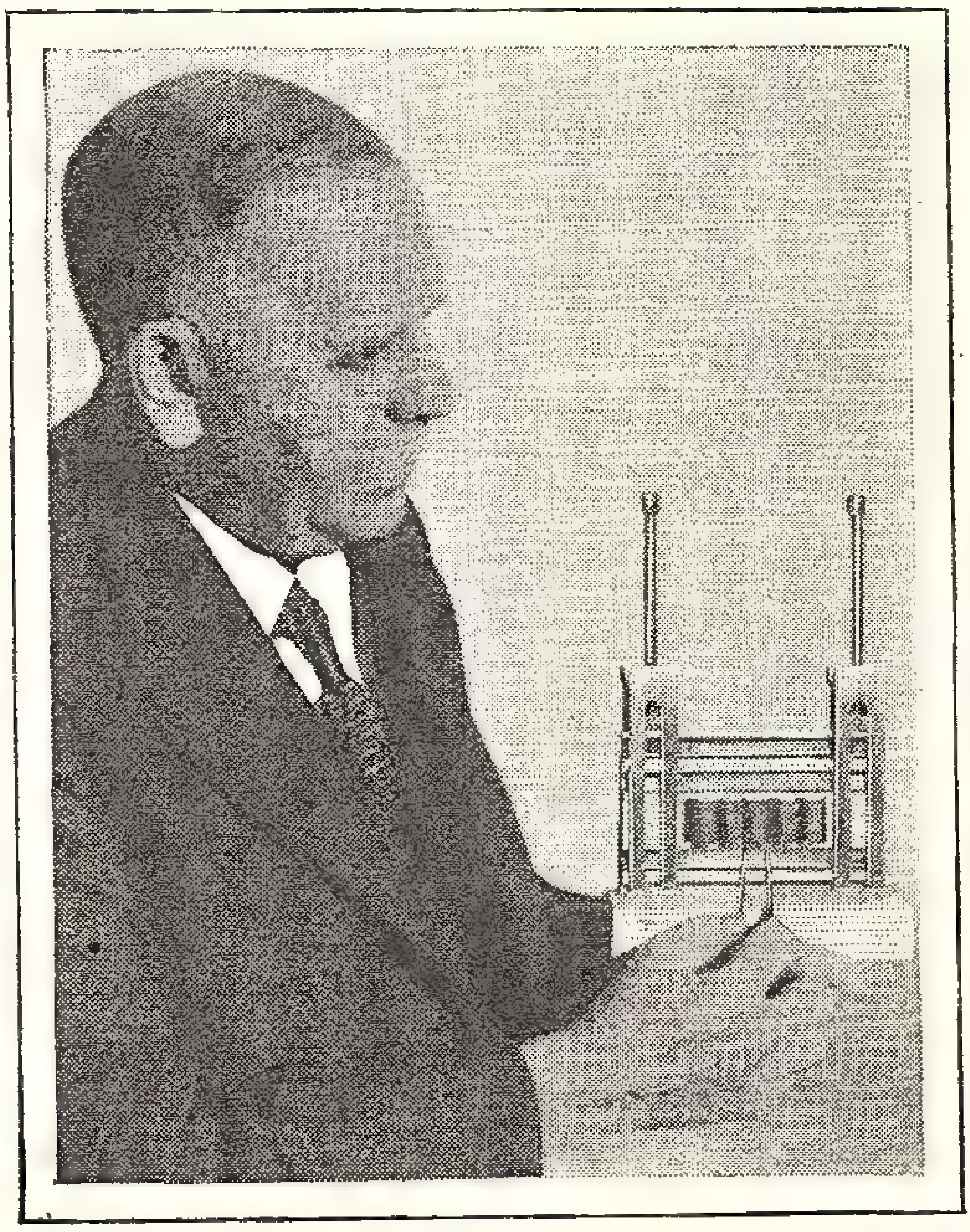
Lowliest Microbes Have Memories

A RECENT experiment by a French biologist led him to believe that memory exists in all living cells, even to the lowliest microbes. The experiment proved that small nervous stimuli, like a weak light in the eye or a feeble touch to a nerve, although too feeble to produce individual reactions, will do so if repeated several times. The microbes react similarly to each successive stimulus.

Measures Millionth of an Inch

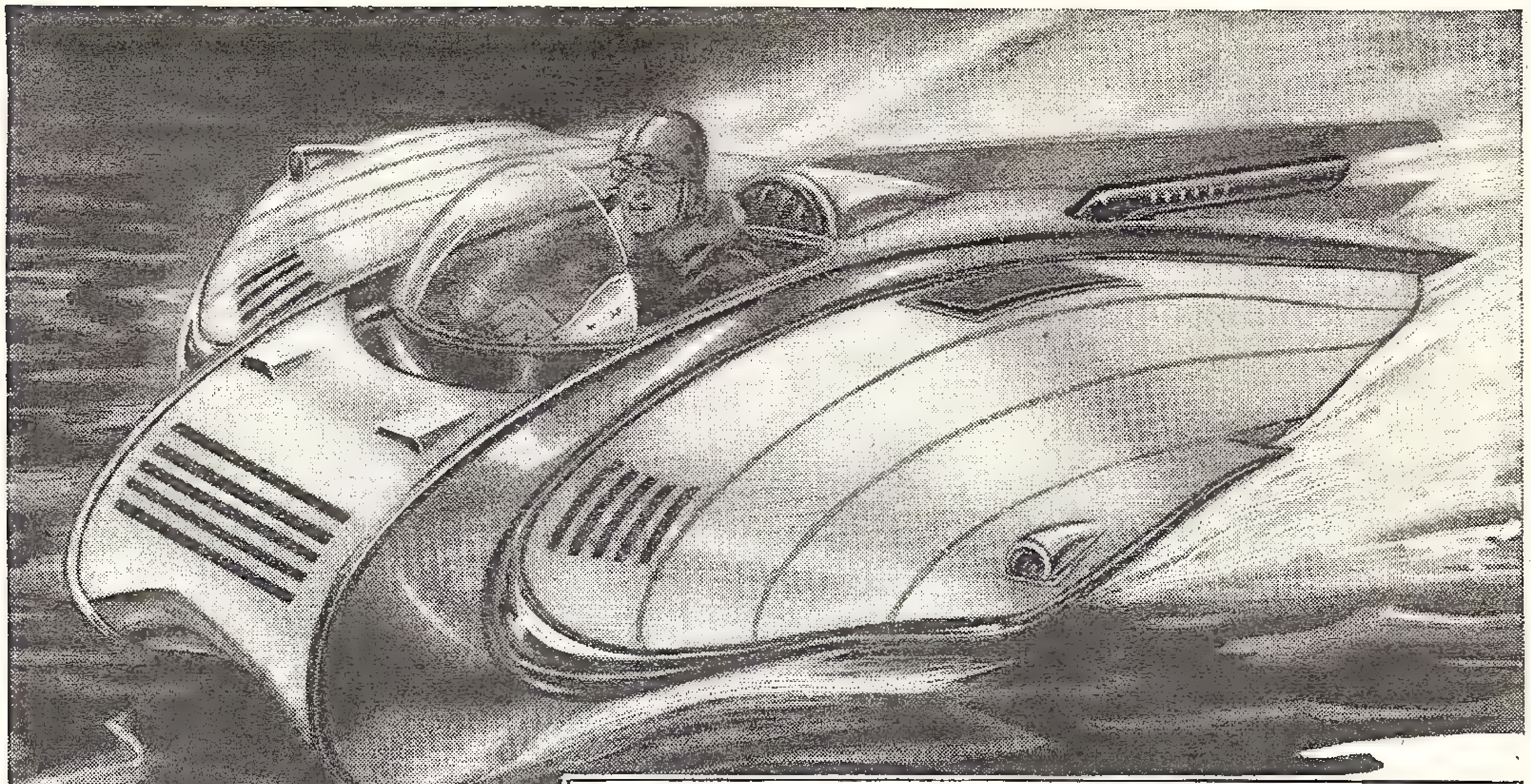
AN APPARATUS which permits engineers to feel the difference in the length of metal blocks of two millionths of an inch was recently demonstrated before a national conference of gauge and measure experts at the headquarters of the American Standards Association in New York City.

The purpose of the conference was to bring about international uniformity in the units of length, the inch and the millimeter. C. E. Johannson of the Ford Motor Company is shown with the new apparatus in photo below.

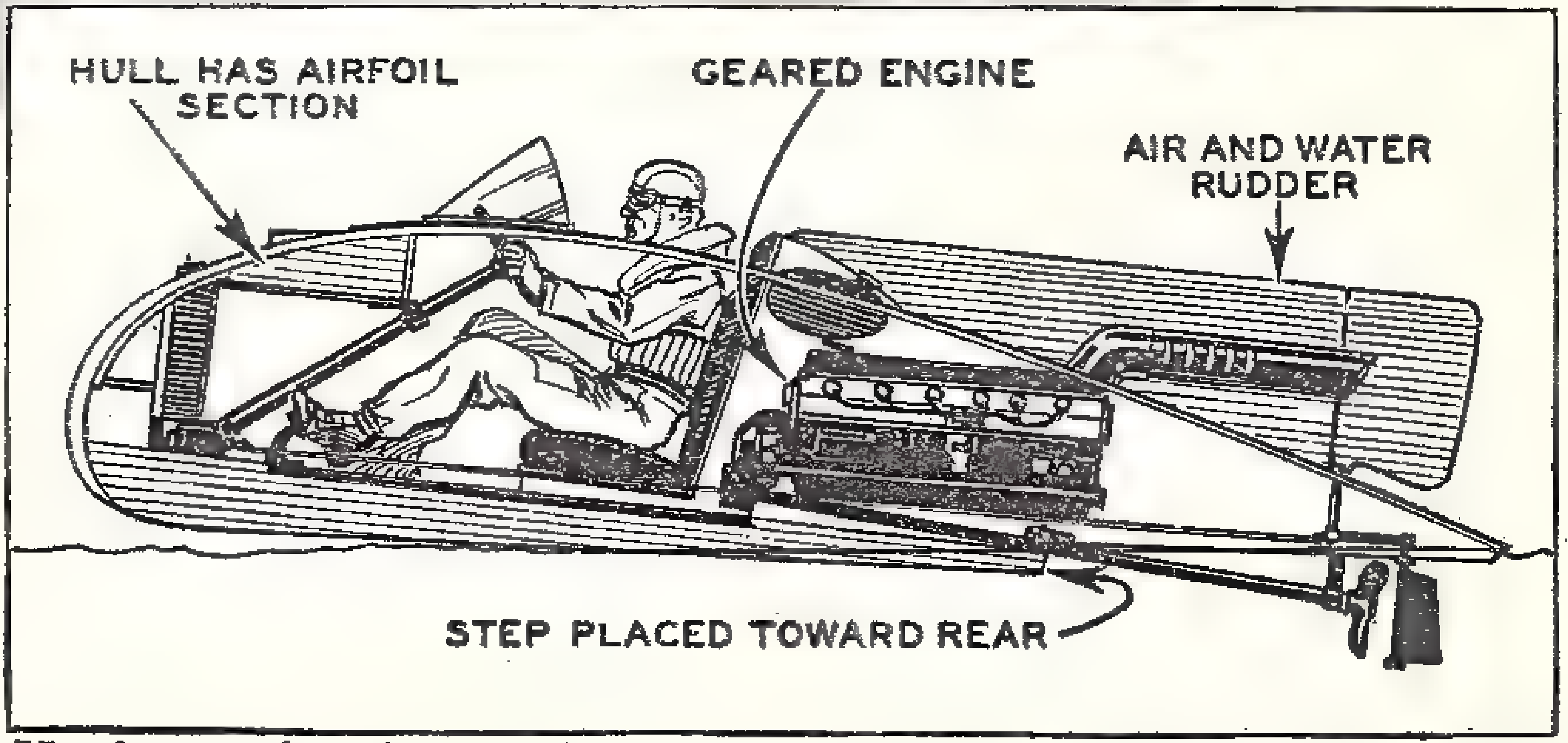


Here is new instrument which permits engineers to feel the difference in the length of metal blocks of two millionths of an inch. It will improve and speed construction work.

Airplane Influence in Speed Boat



Spray deflectors of airfoil section serve two purposes; give lift and keep boat free from flying spume and water.



Here's a section through the novel speedboat built by a New York inventor, giving an idea of the new arrangement. The fore plane is long, the step section short, and the flatter forward plane is considerably less bumpy.

SPEEDBOATS have for many years been the subject of attack by inventors. Many of the so-called "solutions" are merely brainwaves such as wheels in water for the boat to run on and so on. The readers of MODERN MECHANIX AND INVENTIONS will immediately recognize something rational in the above solution, which is a development of existing elements, put together in a new way so as to achieve new comforts, new speed and utter dryness.

The hull is of a thick wing section above the water, and has a flat bottom with step placed far to the rear in accordance with the new thought in hydroplaning surfaces.

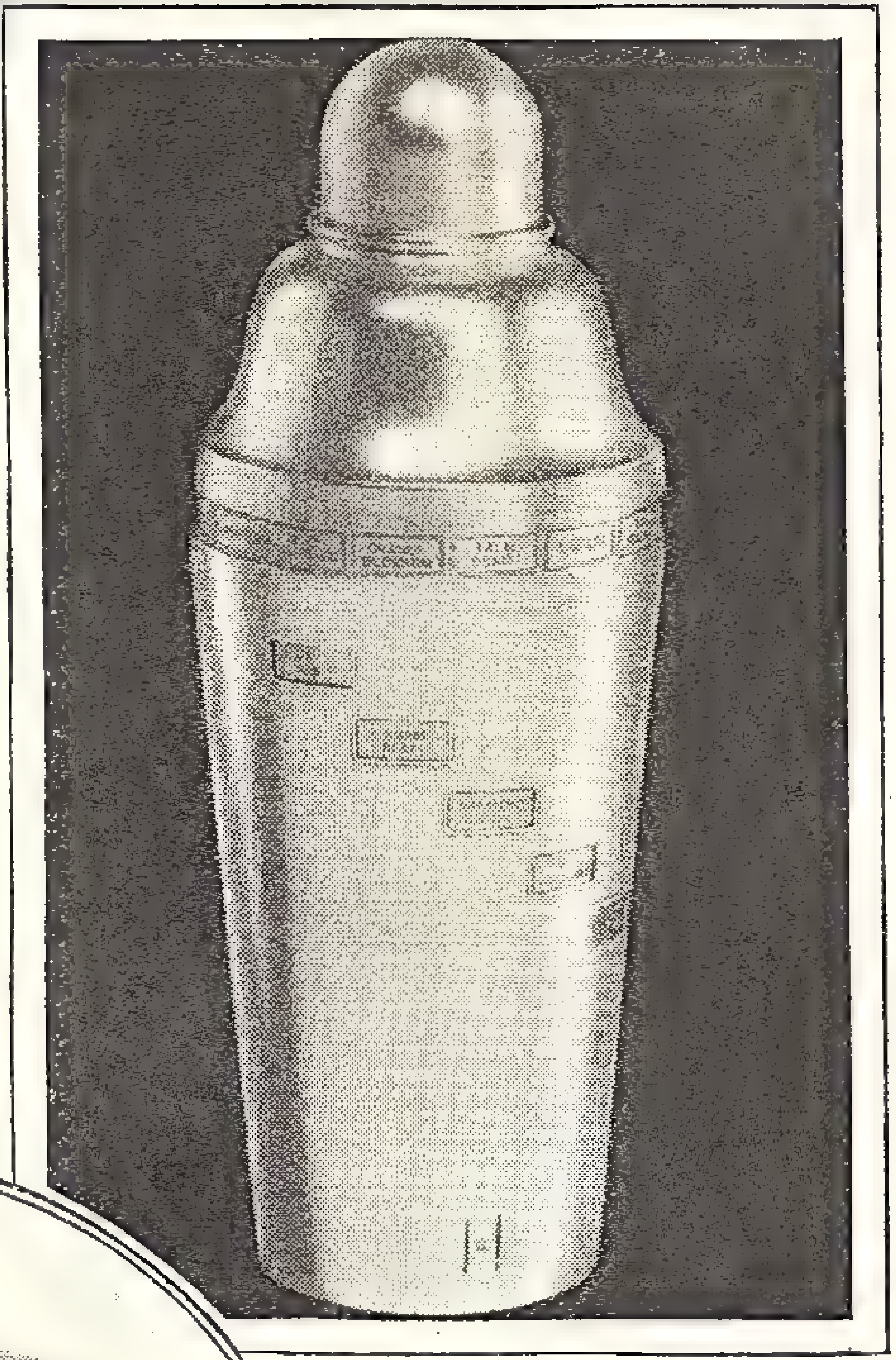
Instead of a cockpit in rear of a roaring motor, the motor is placed just abaft the step, and is geared to the propeller. The exhaust pipe is louvered to induce extra speed of exhausting the hot gases, with some idea apparent in an attempt to speed up the air behind the boat. Whether this is awry or not hasn't been proven, but it would seem to us that this element is not practical.

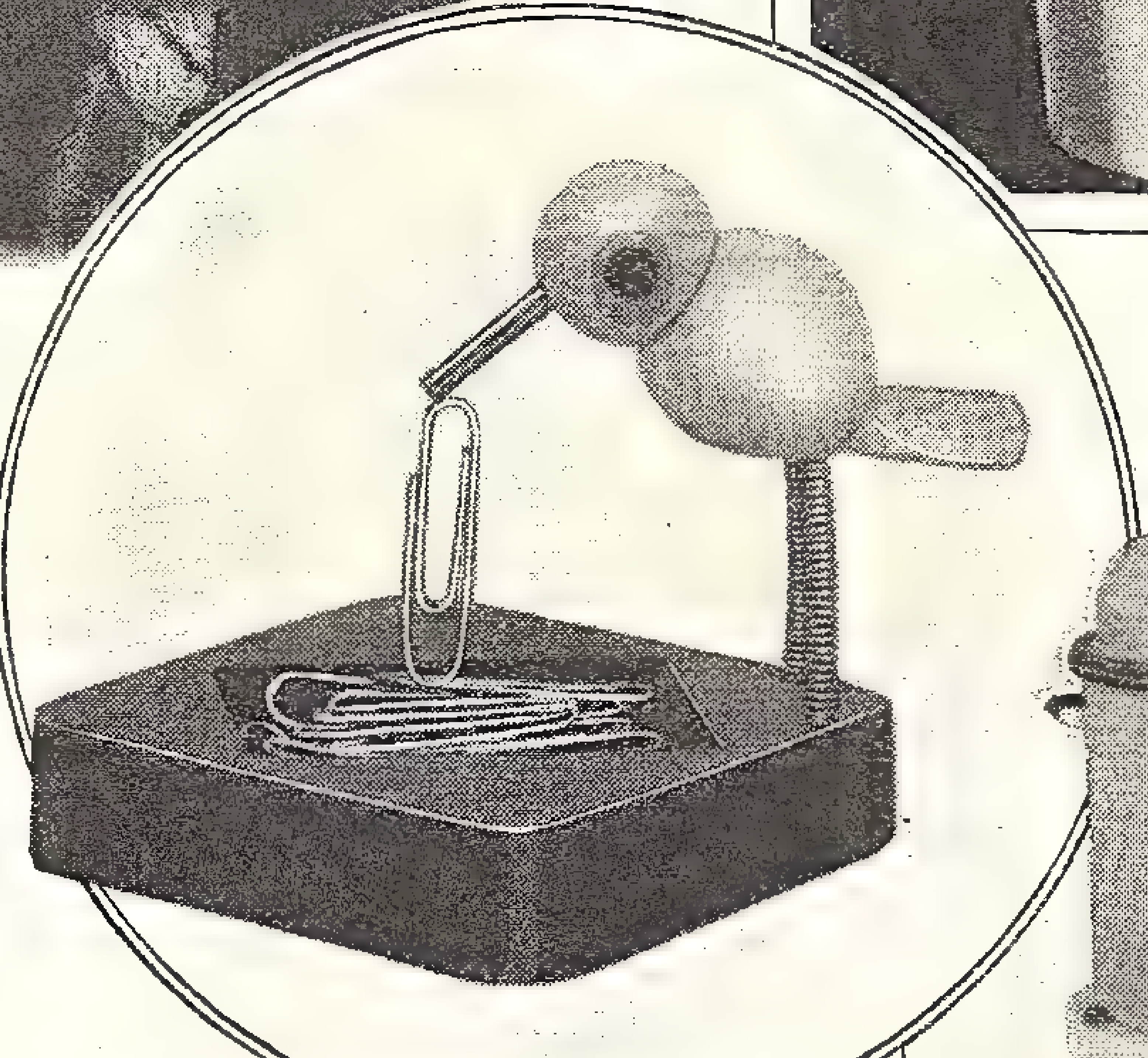
Certainly the matter of having the passengers forward in a deep, well faired cockpit, out of the way of noise, is a distinct advantage. Another thing designed to serve a twofold purpose is the brace of small spray wings on either side of the hull, which serves to kill off flying spume and water, and at the same time help not only the air resistance by more gently opening and closing the flow of air, but possibly obtaining some planing lift by a wind action.

Some years ago Dr. Alexander Graham Bell experimented with a speedboat which had hydrofoils or steel stepladders on the bottom of the hull. It was a large boat, nearly eighty feet long, and had for power two 450 h.p. Liberty motors. Amazing speeds were attained, some in excess of 80 miles an hour, and from that time on, inventors have been trying to adapt airplane principles to speedboats, but with little success. It must be remembered that the medium, air, which airplanes depend upon is 1/800th the weight of water, and that an airplane goes through the medium, whereas a boat goes over the surface. Hence any improvement should take into account the two factors—air through which the boat goes, and water on which it rides.

This boat seems to have been an intelligent attack, capable of comfort and real speed, and is, as you will agree, very stylish and striking in appearance.

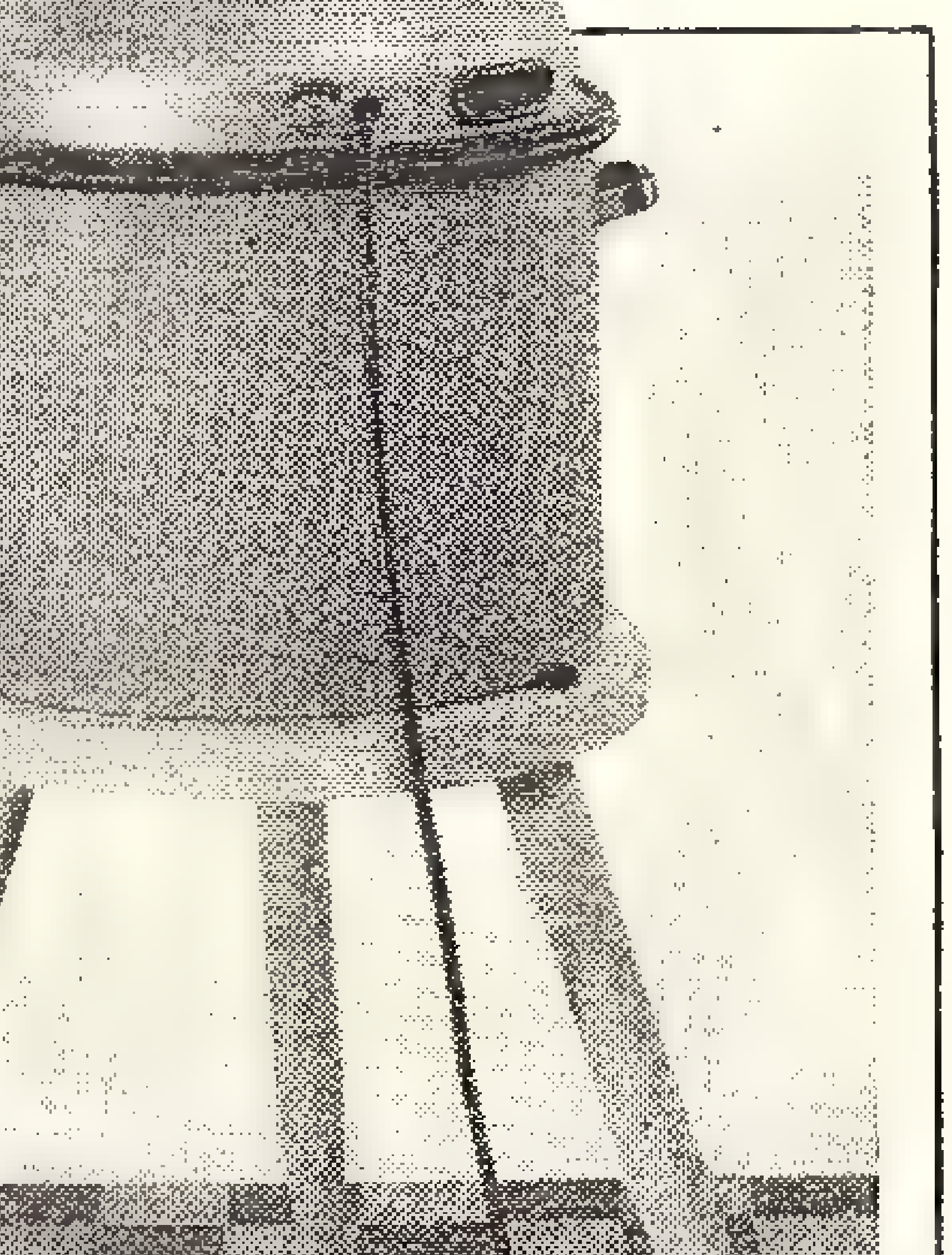
New MECHANICAL AIDS

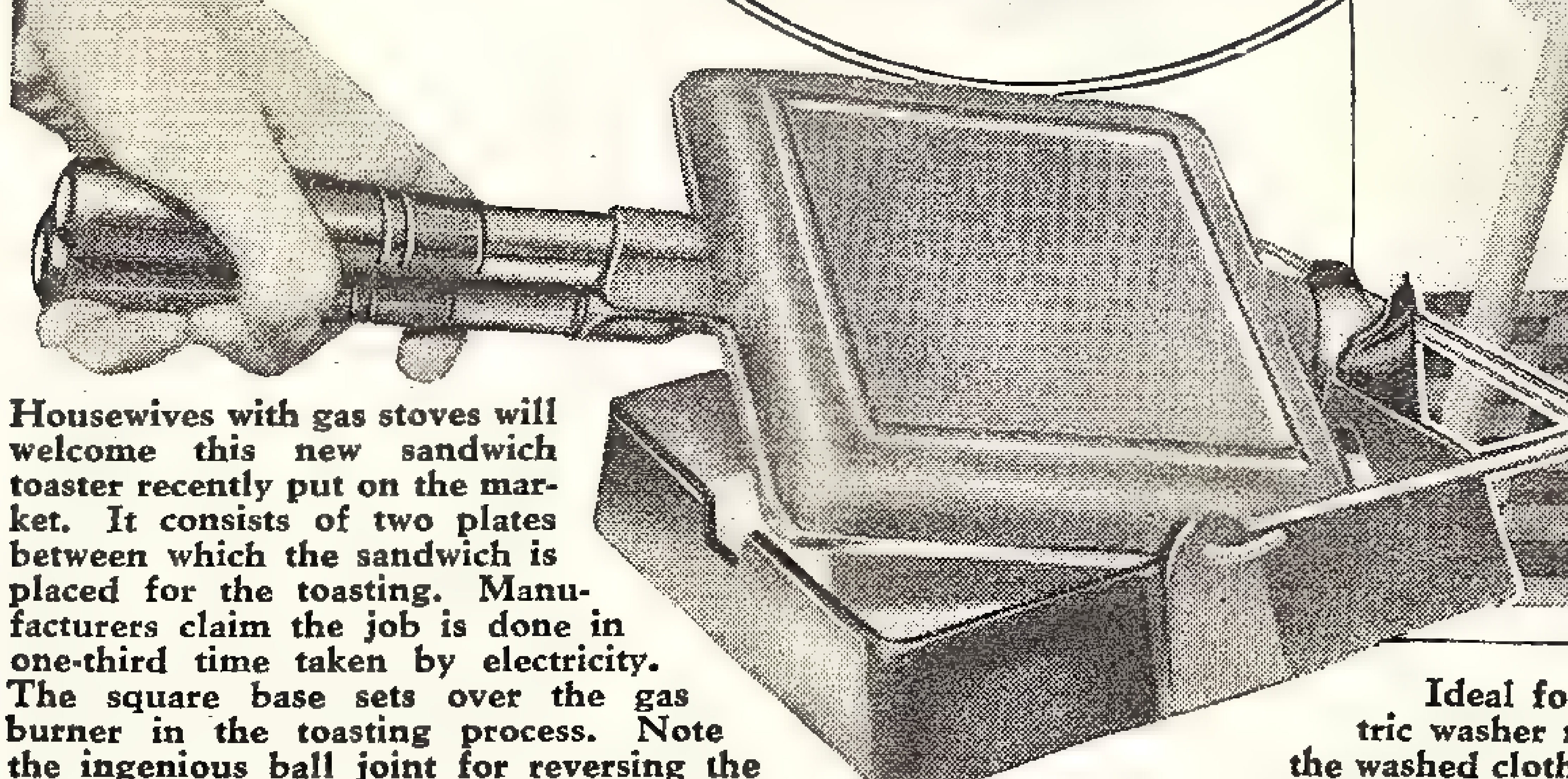




This new contrivance attaches to a milk bottle and converts it into a convenient little pitcher for the dining table. At right is seen Mr. "Pickadoodle," who bends down and with his magnetized beak picks up pins or wire clips. His feet are springs.

Here's the new "Tell-U-How" cocktail mixer which shows you ingredients for your favorite drinks, and measures contents.

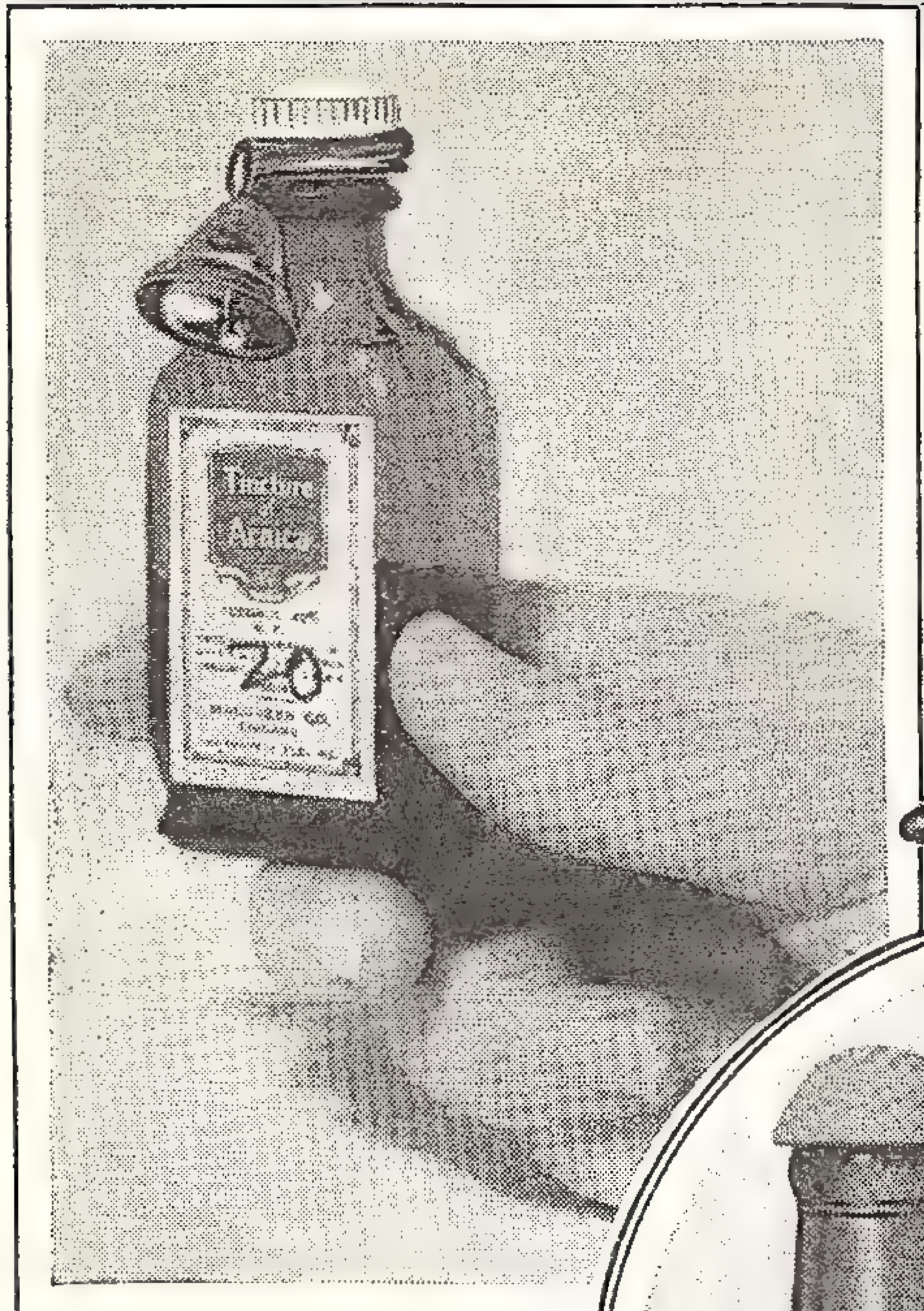


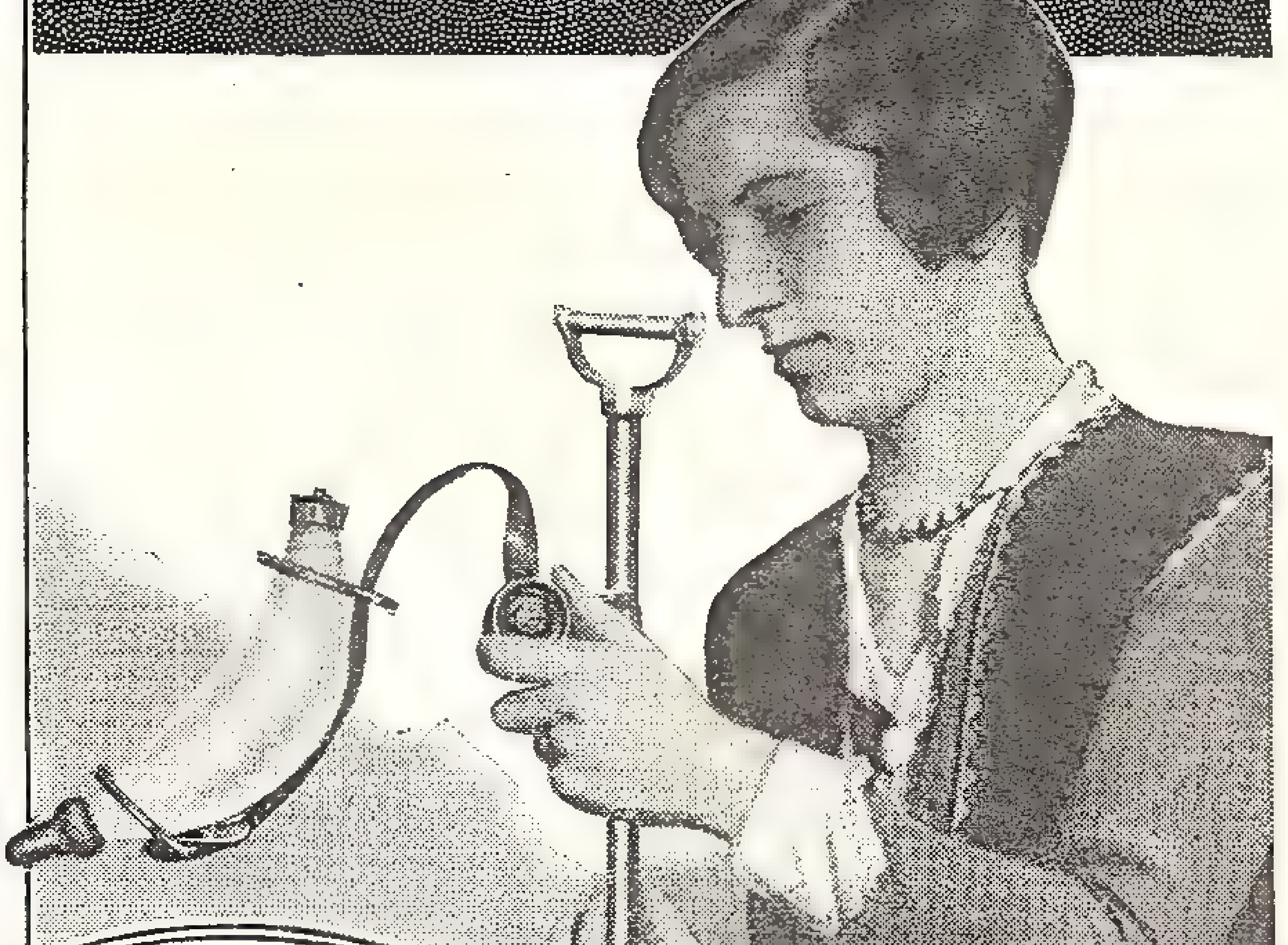


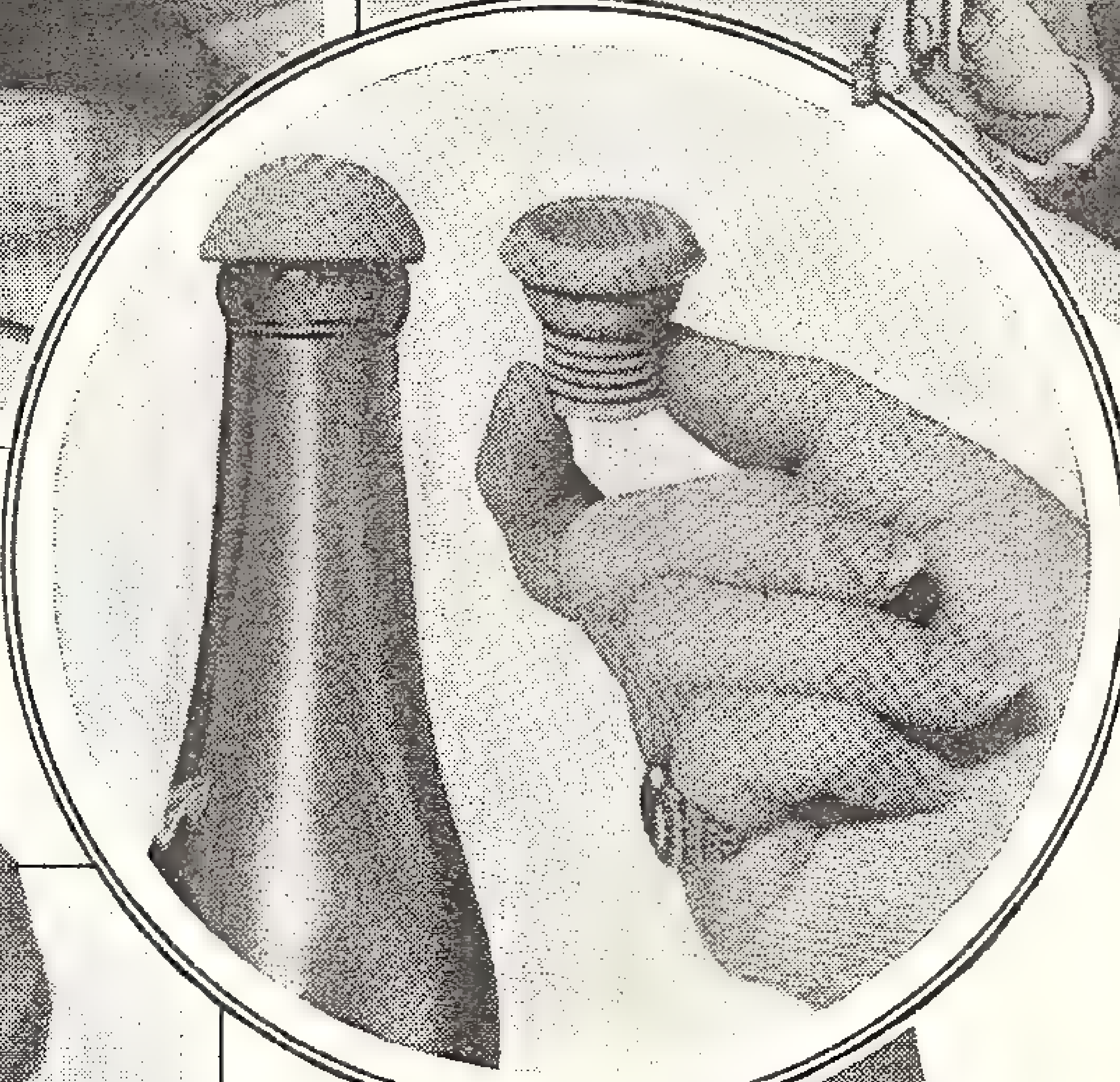
Housewives with gas stoves will welcome this new sandwich toaster recently put on the market. It consists of two plates between which the sandwich is placed for the toasting. Manufacturers claim the job is done in one-third time taken by electricity. The square base sets over the gas burner in the toasting process. Note the ingenious ball joint for reversing the plates. Wooden handles give adequate insulation against heat from the flames.

Ideal for small apartments is a small electric washer now on the market which prepares the washed clothes for the line without the use of a wringer. Concealed in the top is a soft rubber bag which is expanded by water pressure to wring clothes.

for BUSY HOUSEWIVES



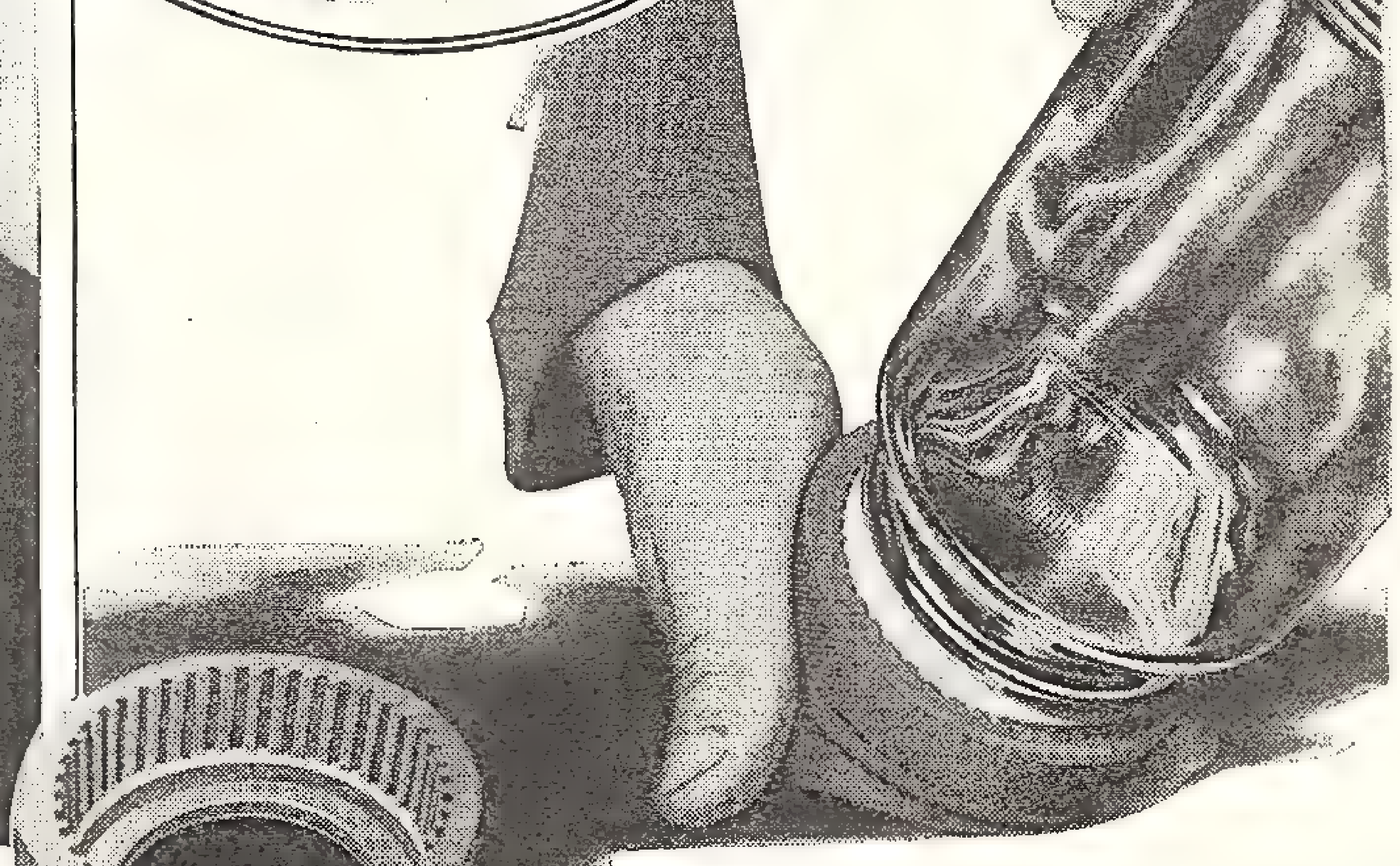




Above—Bell on bottle of dangerous medicine rings warning. Right—New air-tight rubber bottle stopper which seals bottles of catsup, grape juice, etc.

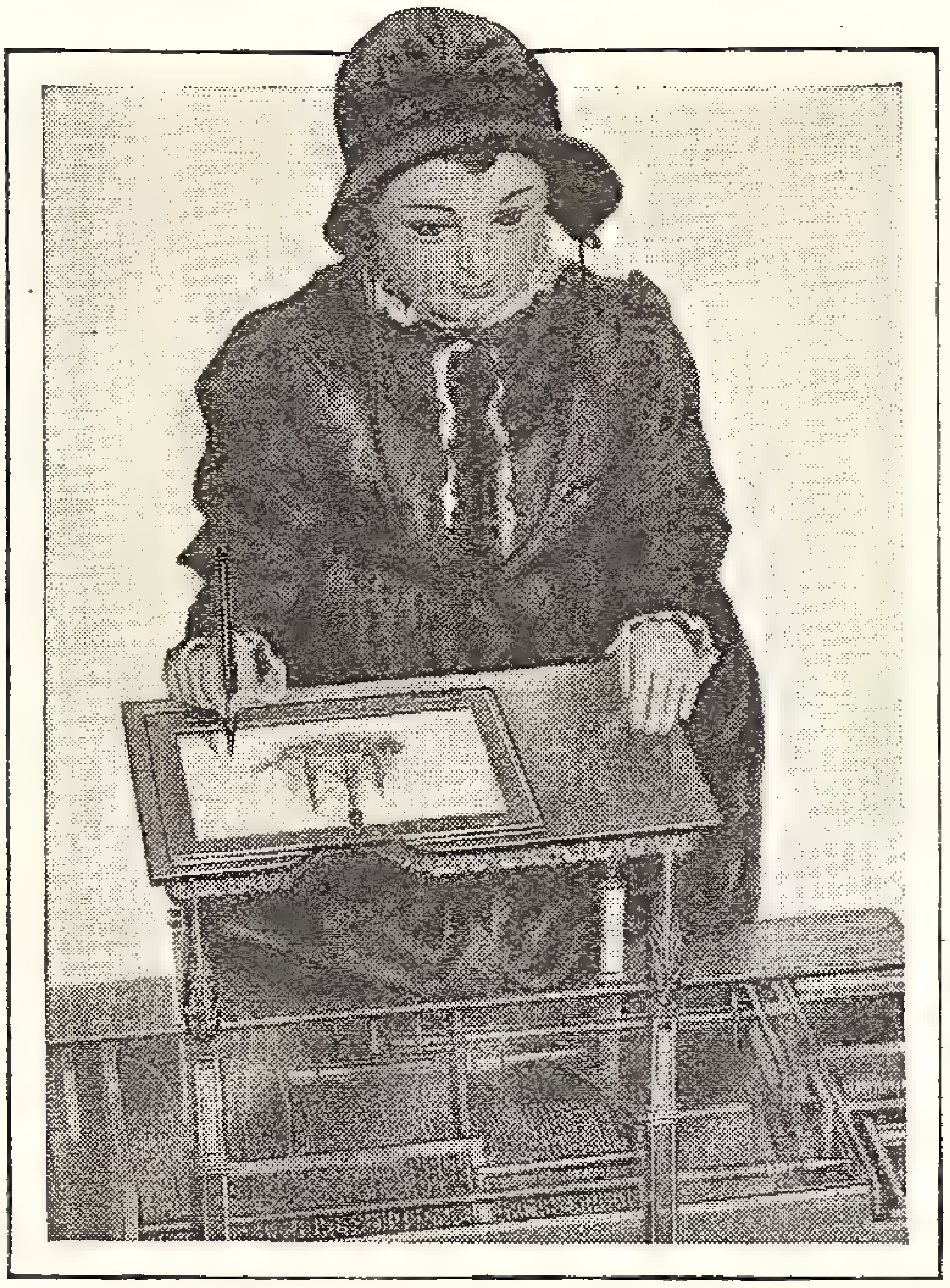
New automatic baby feeder that may be adjusted to any height on the crib by simple twist of wrist.

Latest aid to milady's beauty is this "Kurlasher" which curls the lashes to make eyes more attractive. No heat is required and the device is entirely harmless to the user.



A new kind of cover loosener is now available in the form of a soft rubber ring made to slip over fruit jar covers. It has a series of tiny teeth-like grips which obtain an extremely firm hold on the cover and loosen it immediately without straining the wrist.

Century Old Lady Robot Writes Letters, Draws Pictures



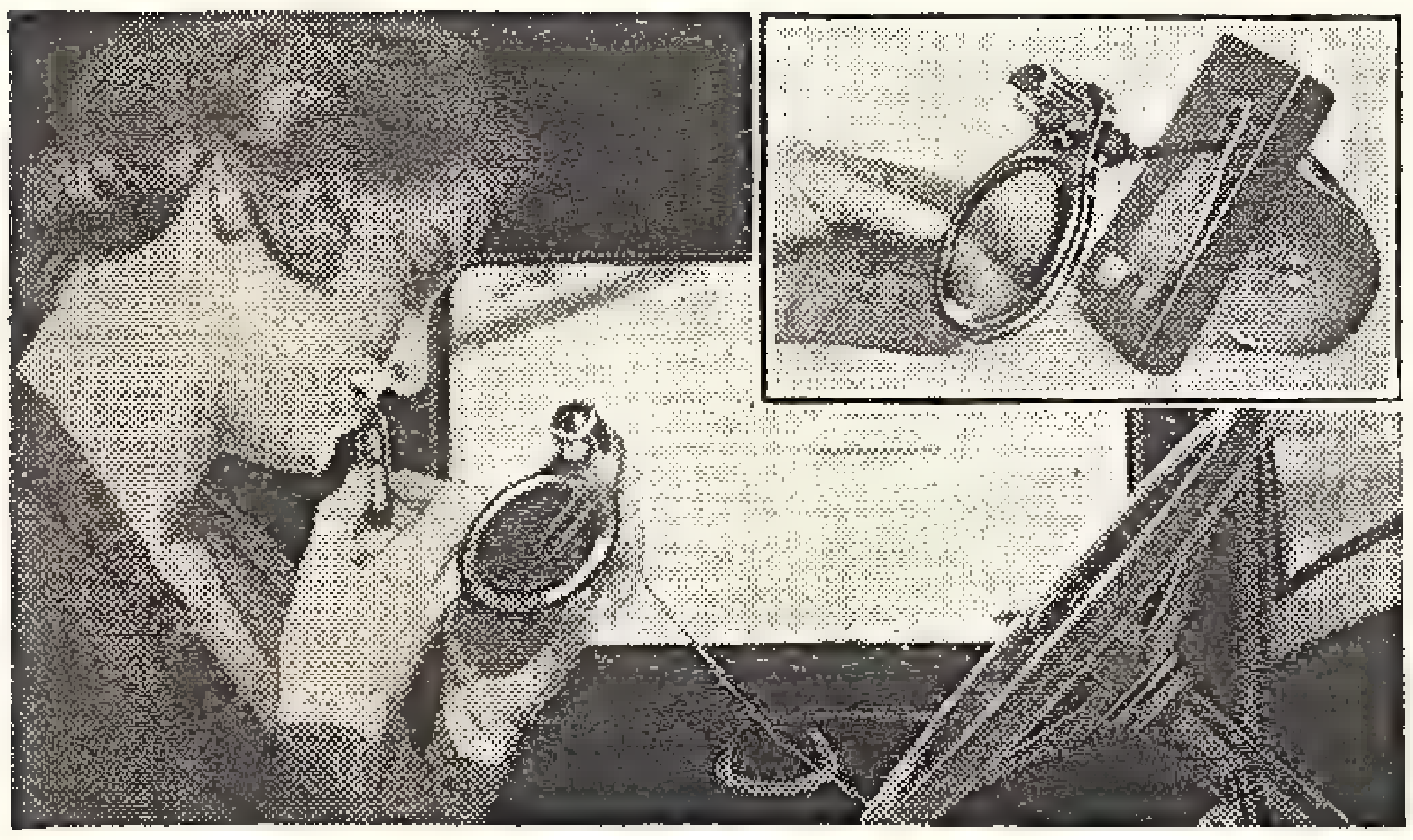
Here is "Miss Automaton," the century old robot which draws pictures and writes letters according to the dictates of the mechanism situated at her feet.

ROBOTS are not strictly a modern invention. At the left is seen "Miss Automaton," a robot doll over a hundred years old. When a motor is geared to its mechanism, which is located under the table, the doll writes letters and draws pictures with a pen which it holds in its right hand. In the photo she is seen drawing a ship for the amazement and amusement of spectators.

"Miss Automaton" now reposes in the Franklin Institute in Philadelphia, and is the gift of John W. Brock, of Philadelphia, whose father, John Penn Brock, bought the doll in 1870 in France.

Milady Can Now Make Up in Auto

HAVING in mind the feminine weakness of always desiring to look pretty, inventors have devised a special accessory for automobiles which permits milady to do make-up jobs right in the car. The device consists essentially of a mirror which may be detached and brought up close to the face, as illustrated in the photo below. A cord which winds off a drum and which follows the light delivers juice to a bulb mounted above the mirror so that good illumination is provided. The device may also be used in case of an emergency at night as a trouble light. The receptacle fits in the dash of the car.

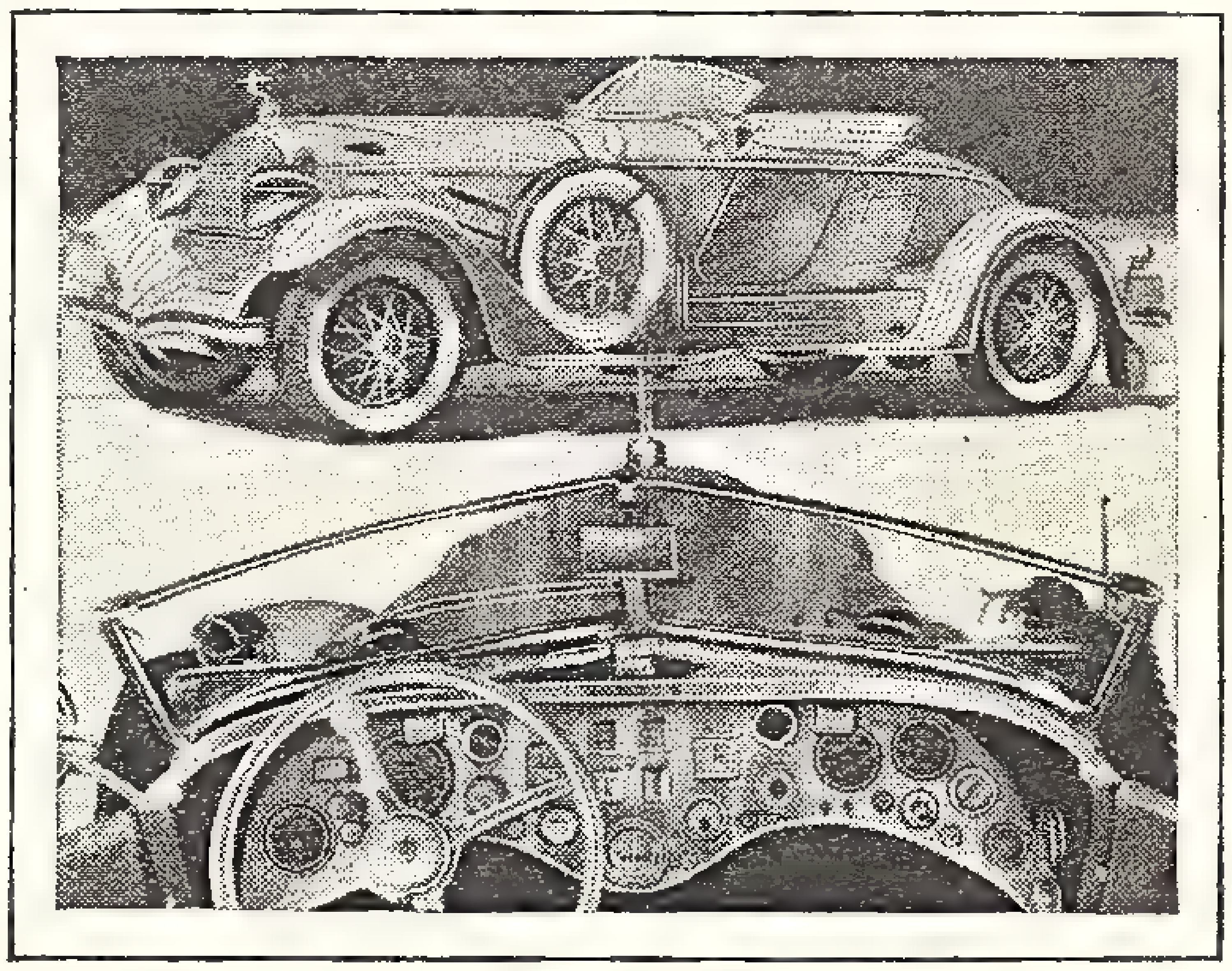


When milady wishes to make up she simply removes this mirror from the dash and applies the powder and lipstick. Light on top provides plenty of illumination for the job.

Champion Auto Has 59 Gadgets

TO LAWRENCE GRAYSON, of Los Angeles, goes the honor of having a car equipped with every accessory that automotive engineers could possibly devise. All told, 59 instruments are at the command of Mr. Grayson's hands, legs and eyes, as he negotiates the highways in his machine.

Among the instruments is an imported time switch for operating either parking lights or a theft device which, when the car is tampered with, releases a charge of 32,000 volts at the trespasser. Also there is included an air speed indicator, a greasing memorandum dial, a radio station selector.

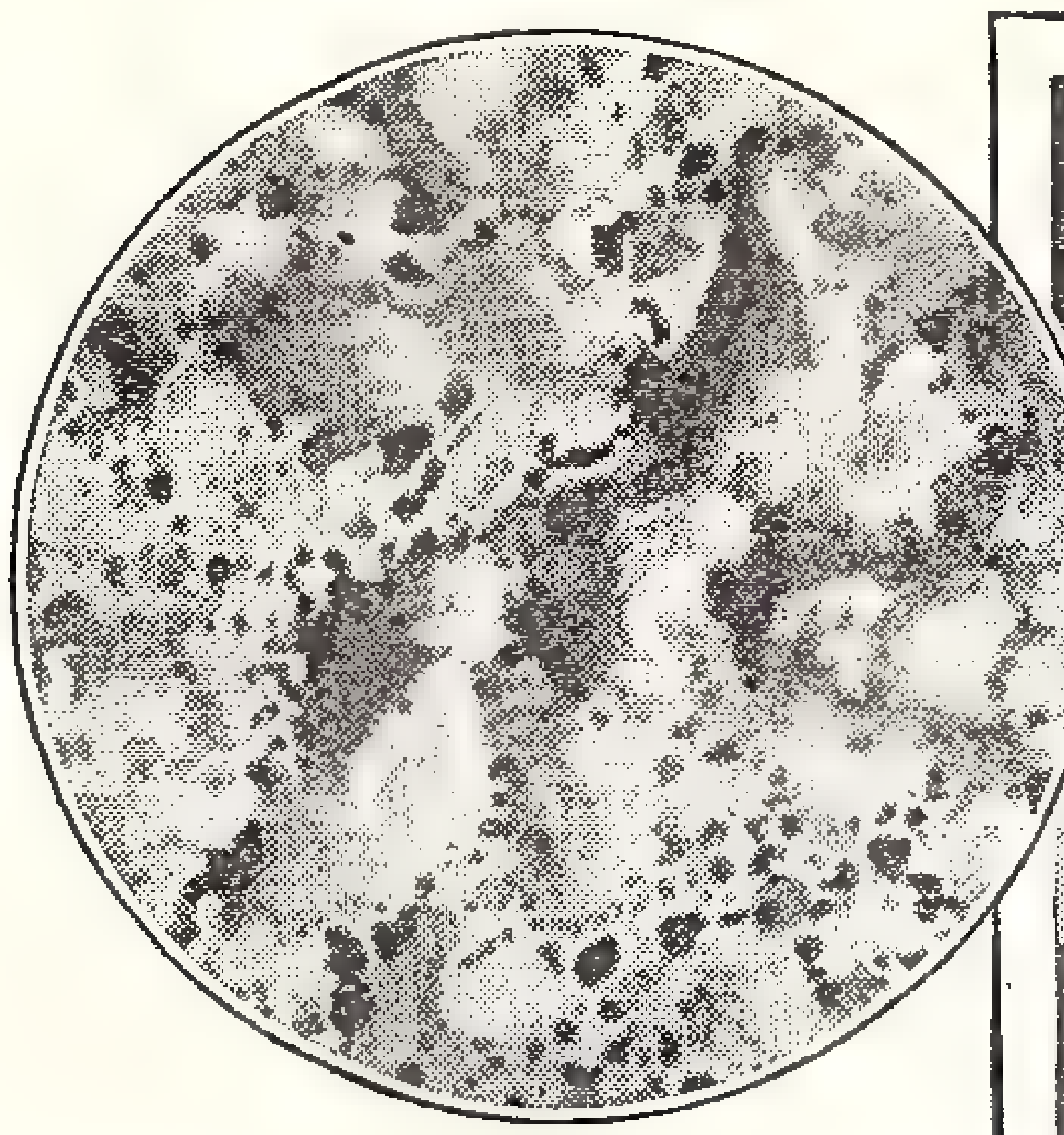


Every conceivable gadget, from an air speed indicator to an electric thief trap, is built on this champion car. Owner, Lawrence Grayson, has been collecting gadgets 7 years.

Freckles Frozen Off With Dry Ice

FREEZING off freckles by means of pencils of compressed carbon dioxide snow, often called "dry ice," is a new method of getting rid of these skin blemishes devised by an Italian physician, Dr. M. Matarasso. The dry ice, which will freeze all human tissues solid after contact of more than a few moments, is compressed into a small stick or pencil, sharp-pointed like a lead pencil. The point of this pencil of concentrated cold then is pressed against each freckle in turn for three seconds. After the colored skin of the freckle drops off in about a week, the new skin thus disclosed is white and unmarked.

So Quiet You Can't HEAR a PIN DROP



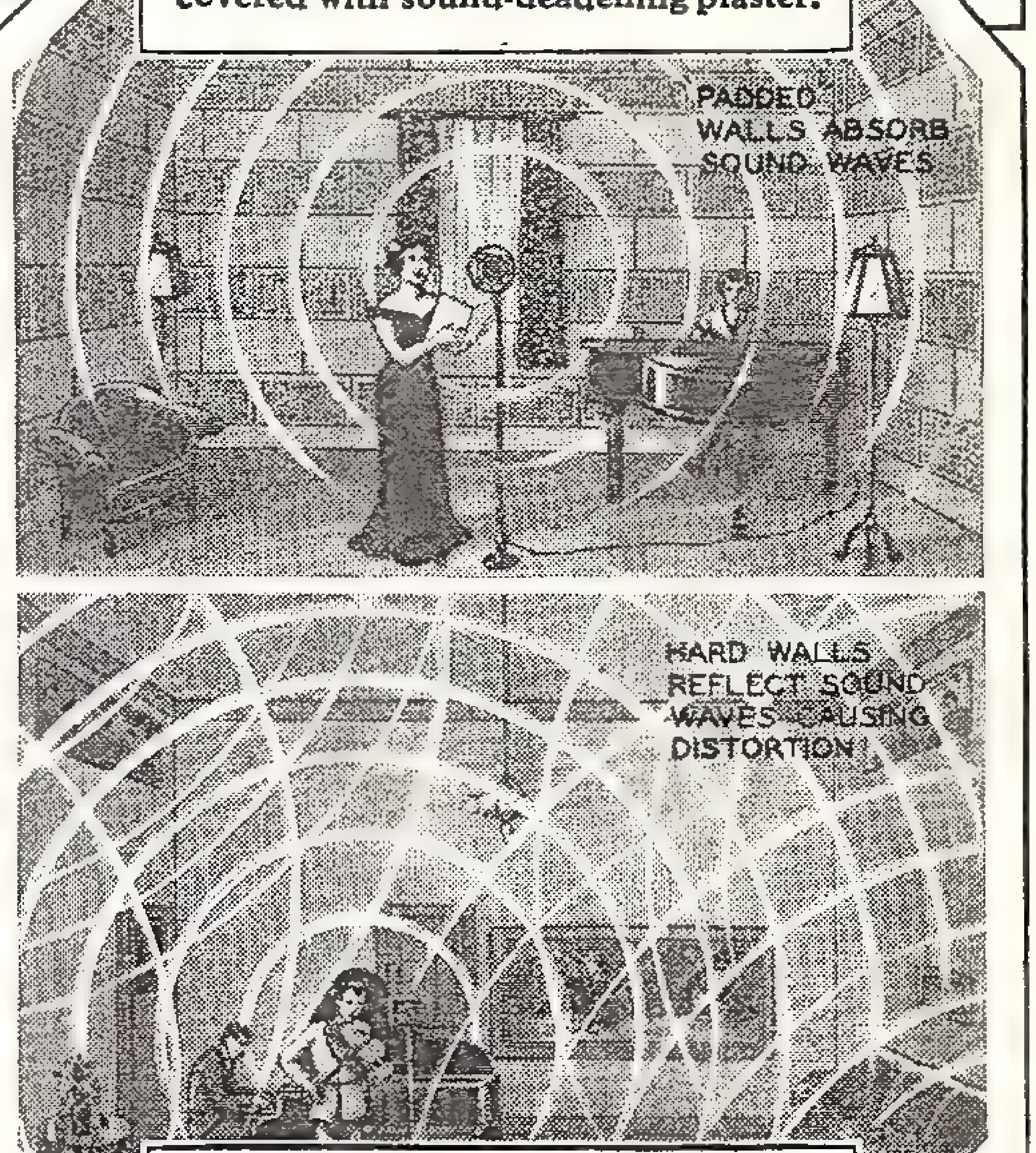
Here is a microscopic view of new sound deadening plaster whose millions of tiny pores absorb sounds instead of bouncing them back into the studio, causing distortion.

Radio City studio whose walls are covered with sound-deadening plaster.

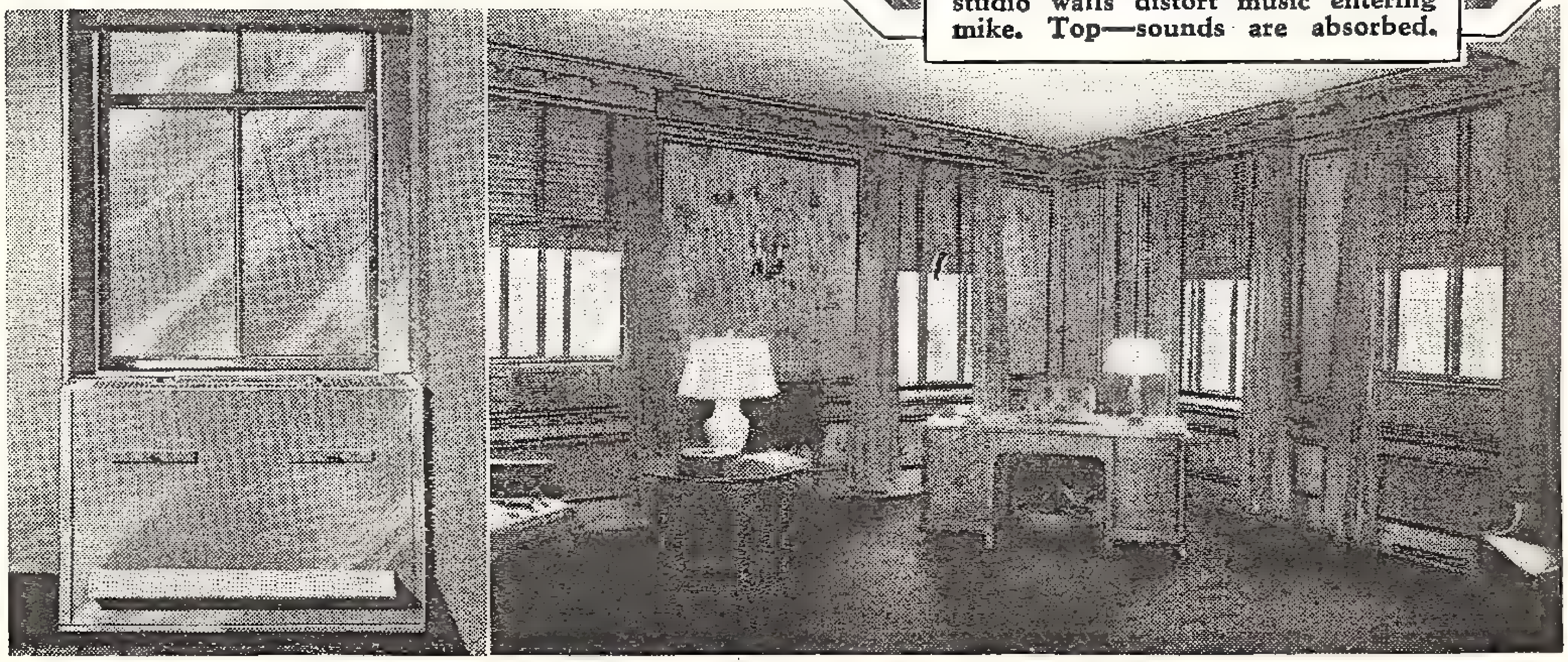
"SO QUIET you can hear a pin drop," is an old saying, but to make a place so quiet you *can't* hear a pin drop is the ideal of the great Rockefeller Center now being built in a noisy part of New York.

Efforts to realize the ideal of complete soundlessness have decided the acoustical engineers to plaster the walls and ceiling of R. K. O. theatre and International Music Hall, which will seat 6,000, with a new sound deadening plaster made from pumice from the Imperial Valley of California. This kalite plaster has tiny pores and roughnesses that absorb sounds instead of bouncing them back into the room as shown in an accompanying drawing.

Sounds originating in New York streets will be shut out of the studios by means of new Maxim-Campbell Silencers, invented by H. P. Maxim, of gun silencer fame. This device literally tires out the sound, absorbing it completely before it can reach the inside of the room.

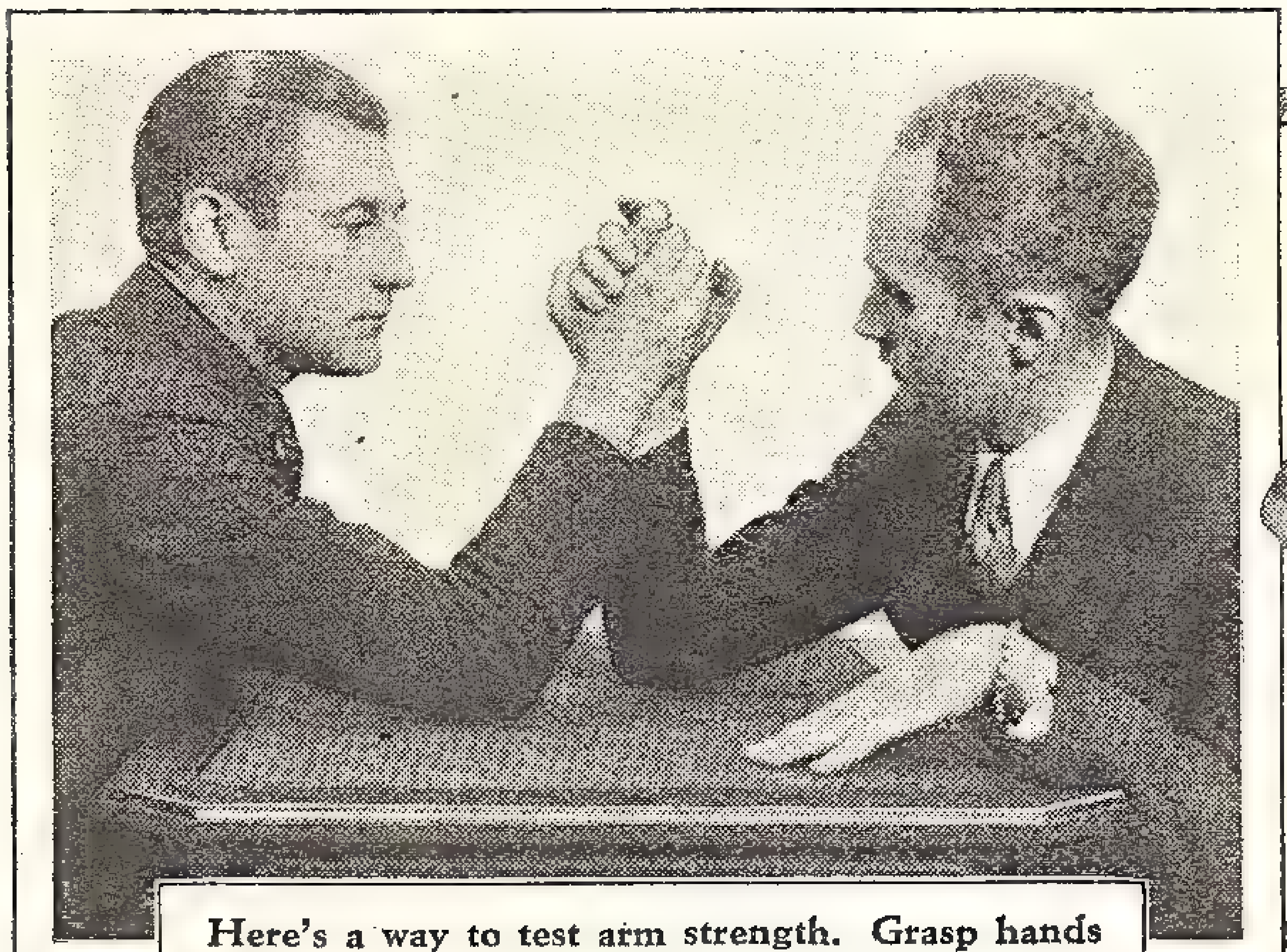

PADDED WALLS ABSORB SOUND WAVES
HARD WALLS REFLECT SOUND WAVES CAUSING DISTORTION

How sound waves rebounding from studio walls distort music entering mike. Top—sounds are absorbed.

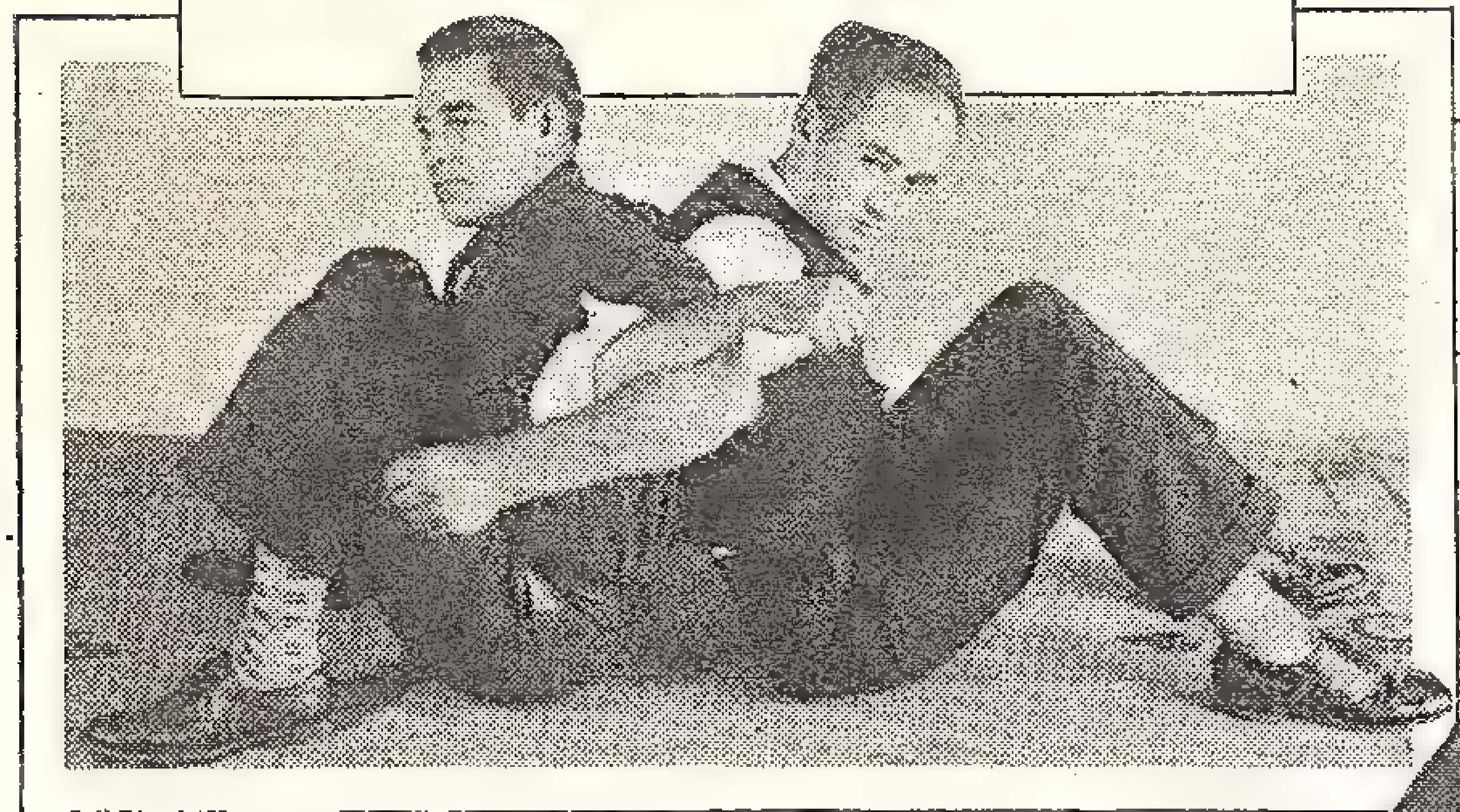


Maxim-Campbell silencer which absorbs sounds from streets. Right—Office equipped with sound deadening apparatus.

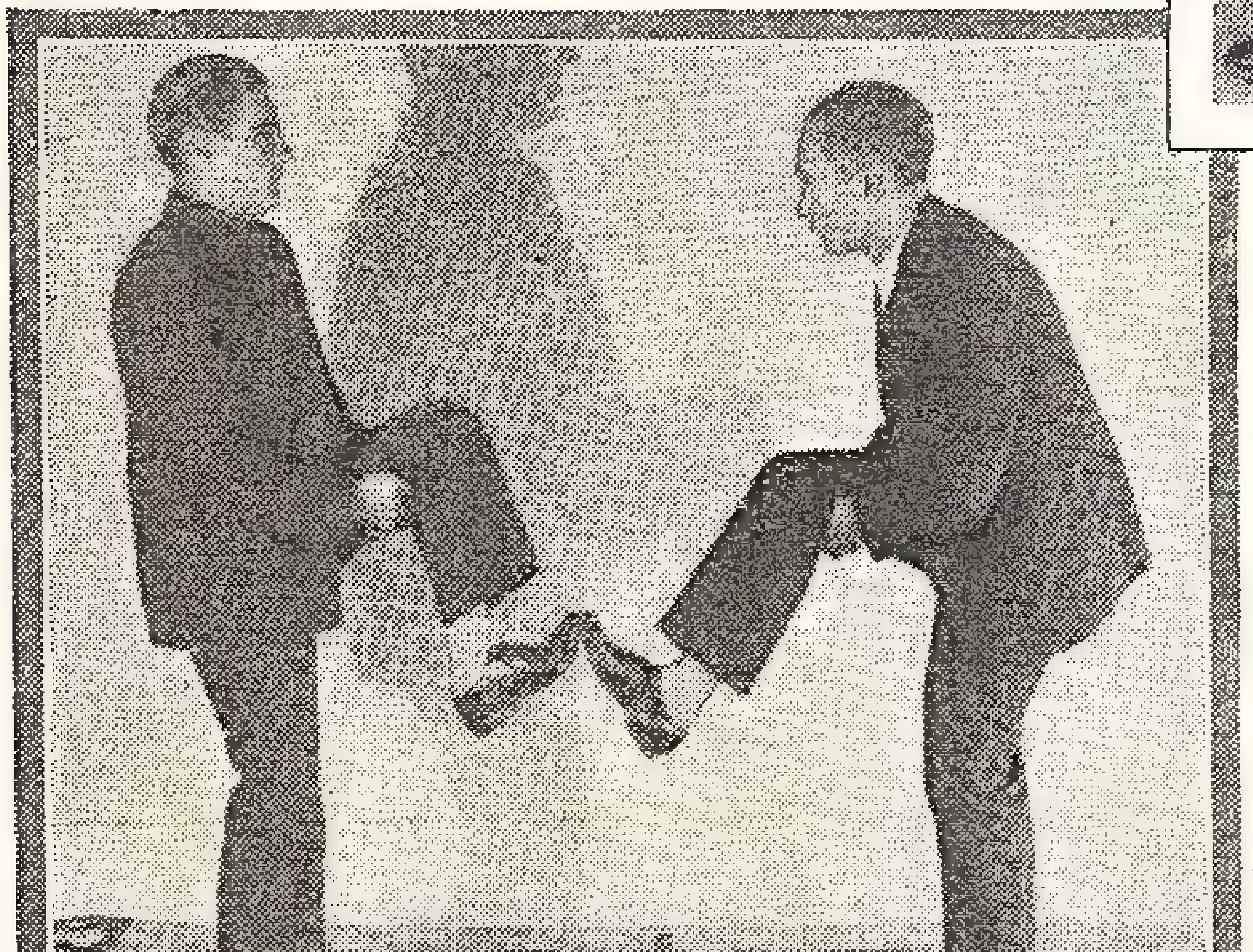
Master These Strength Tests



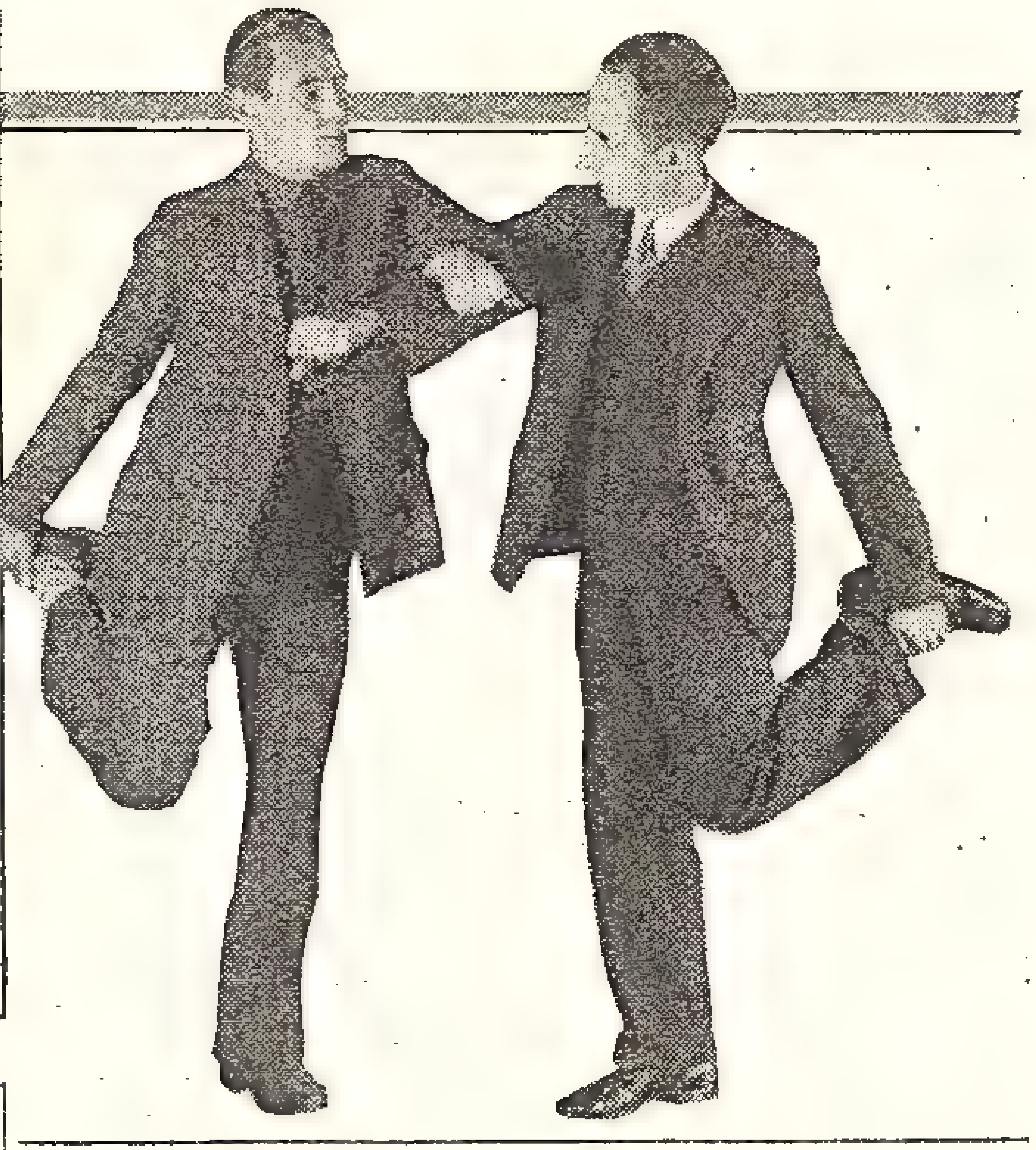
Here's a way to test arm strength. Grasp hands firmly, with elbows placed on table top. At word "go", try to force opponent's hand to table.



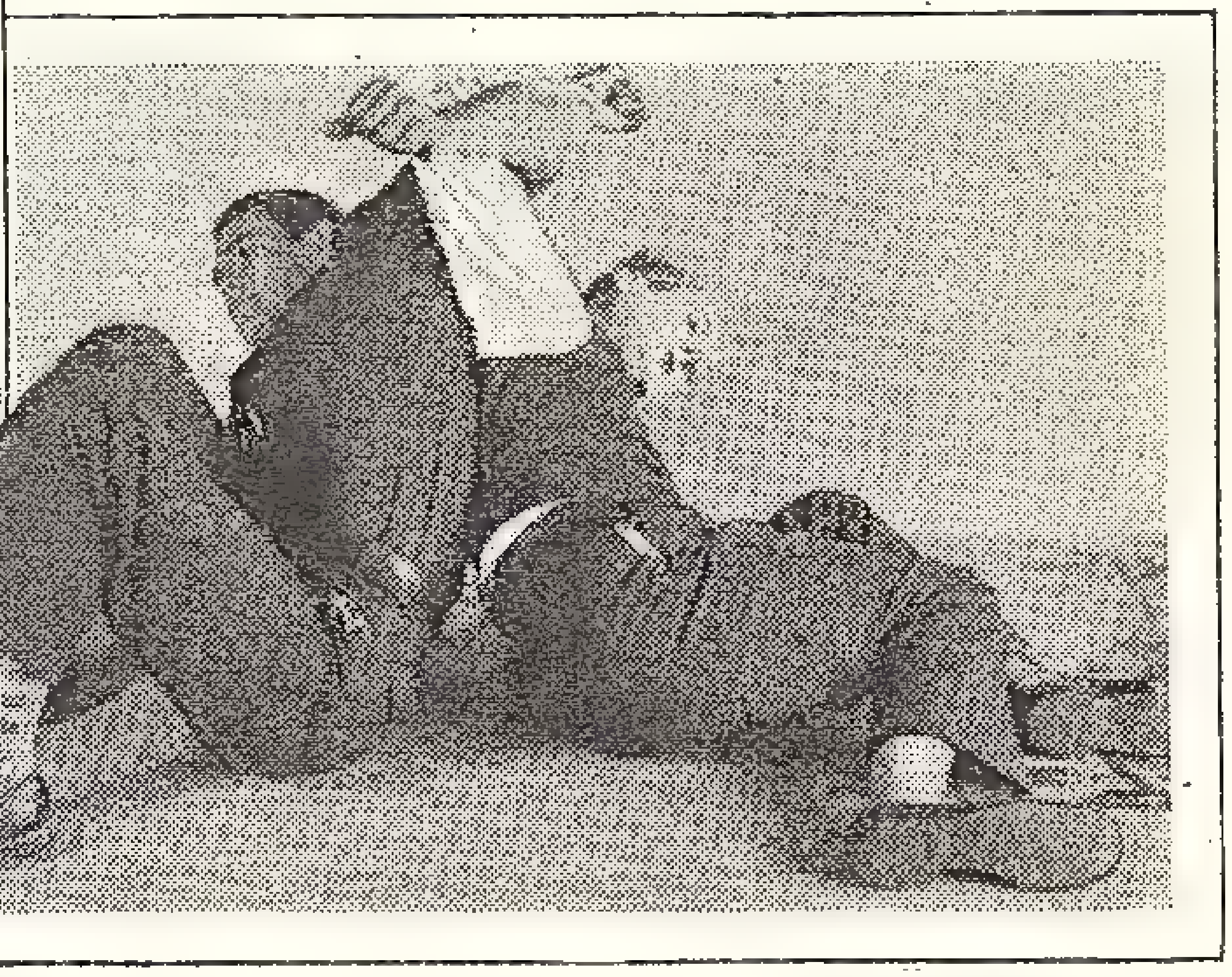
This is a novel method of wrestling which brings into play the muscles of the arms and back. Assume the back-to-back position with knees raised close to chest. Arms are locked with those of your opponent.



Fun galore may be had with this "foot boxing" test. Clasp hands underneath upraised leg and place toes to those of the opponent. Push with toes and try to force opponent off balance. First to unclasp hands is the loser. Plenty of exercise in this, besides testing leg strength. Frequent spills of contestants make this an excellent party game. A little practice will enable you to win easily.



One of the best party stunts imaginable is this balancing test with arms locked and one foot held off floor.

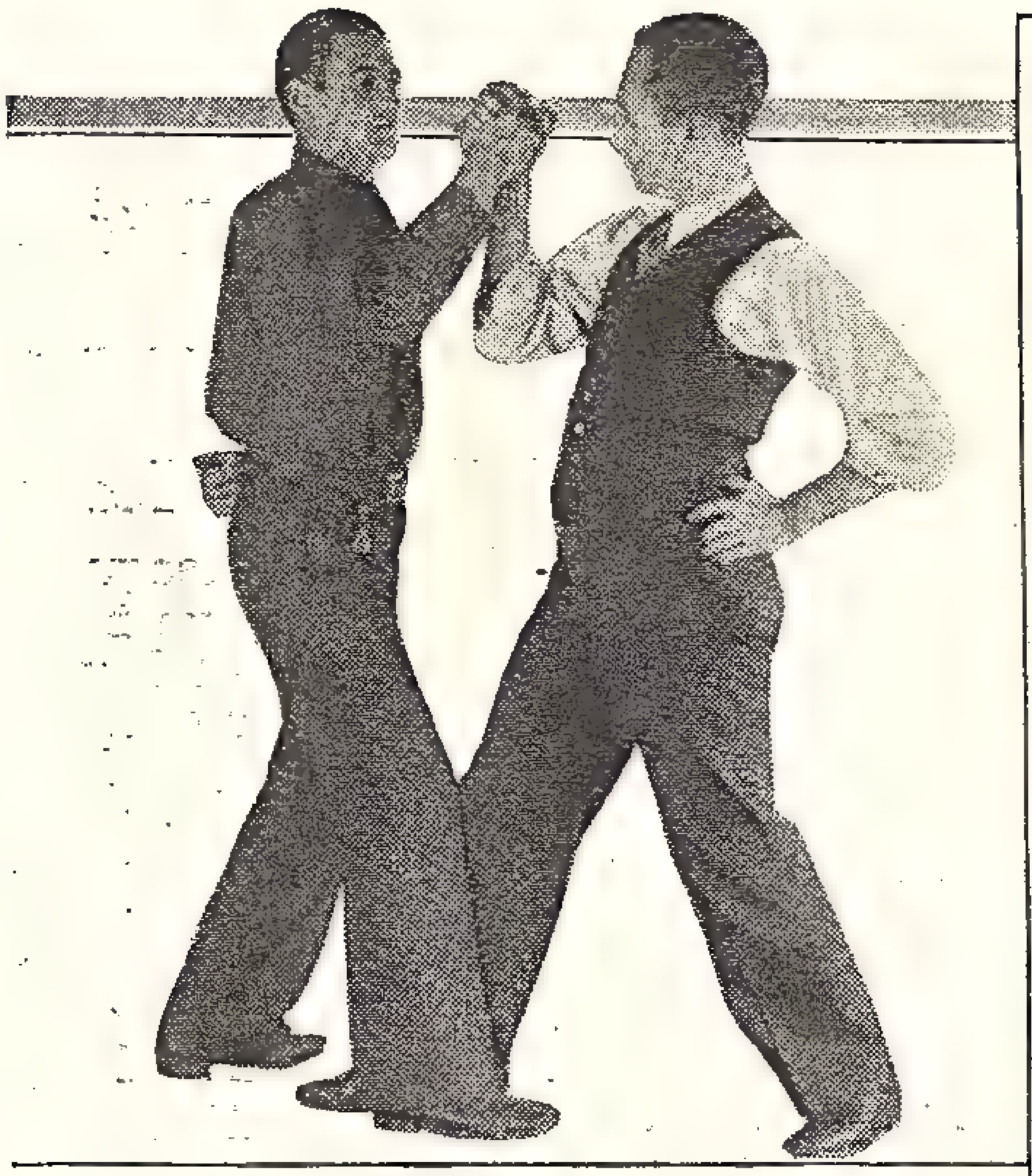


Here's how you work the stunt shown at left above. The idea is to upset the opponent from his seated position on the floor while retaining the back-to-back position. It is possible to stand an opponent on his head.

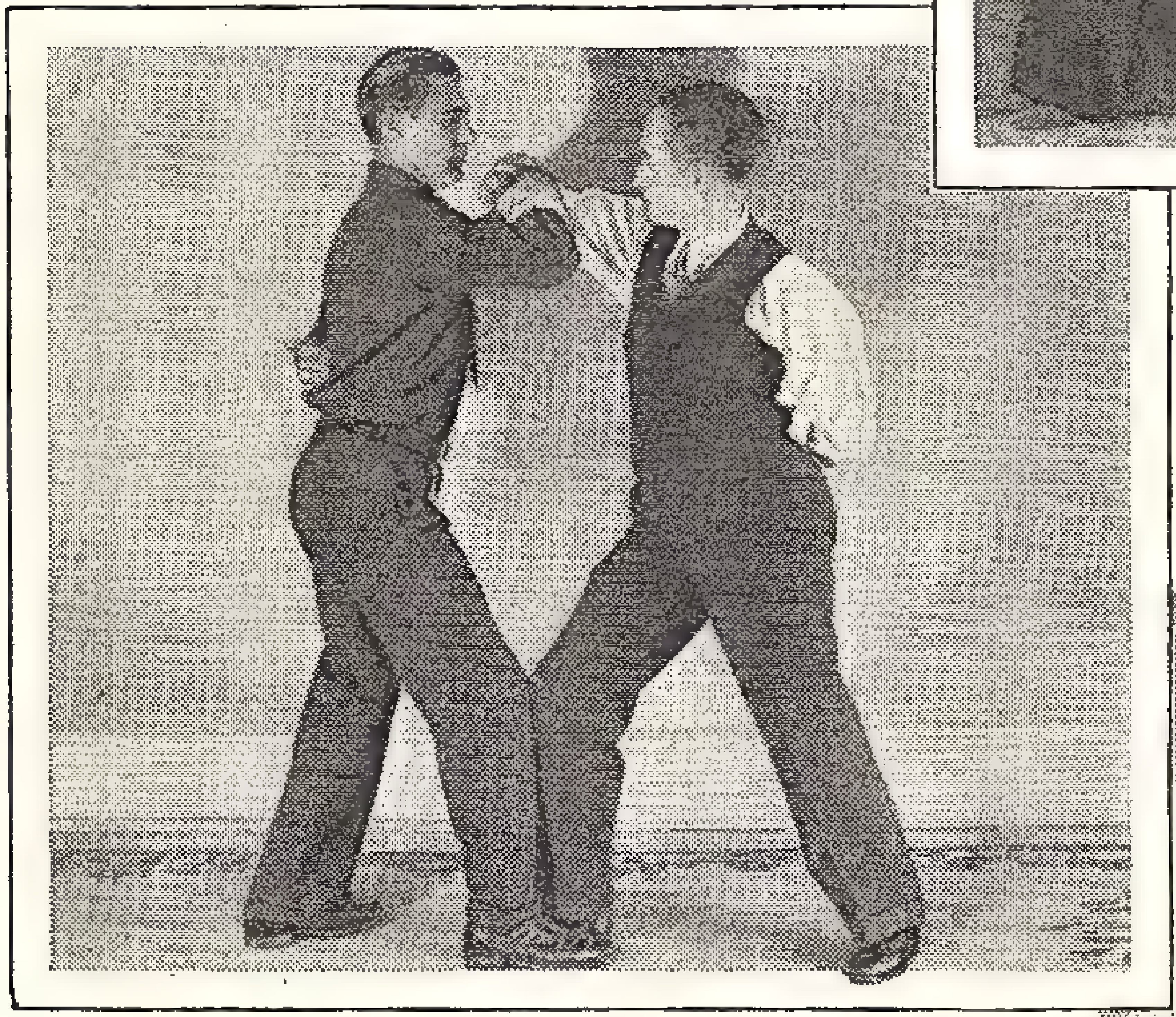
DO YOU want to compare your strength with that of your friends? If you do, here are eight different methods, all simply executed, that will bring into play every muscle of the body. Master these feats and you can hold your own with men of much greater bulk, because they will have failed to develop the distinct muscles brought into use in each of eight separate tests.

The first known use of one of these methods, shown in extreme upper left hand corner, dates way back to 1849 when a grizzled miner challenged a "dude" Easterner while both were partaking of liquid refreshments in a California saloon. The "dandy," having practiced the feat before, offered it as a test. The struggle lasted well over an hour while the two men tensed and flexed their muscles, perspiration pouring from

OUTDO Mightier Opponents



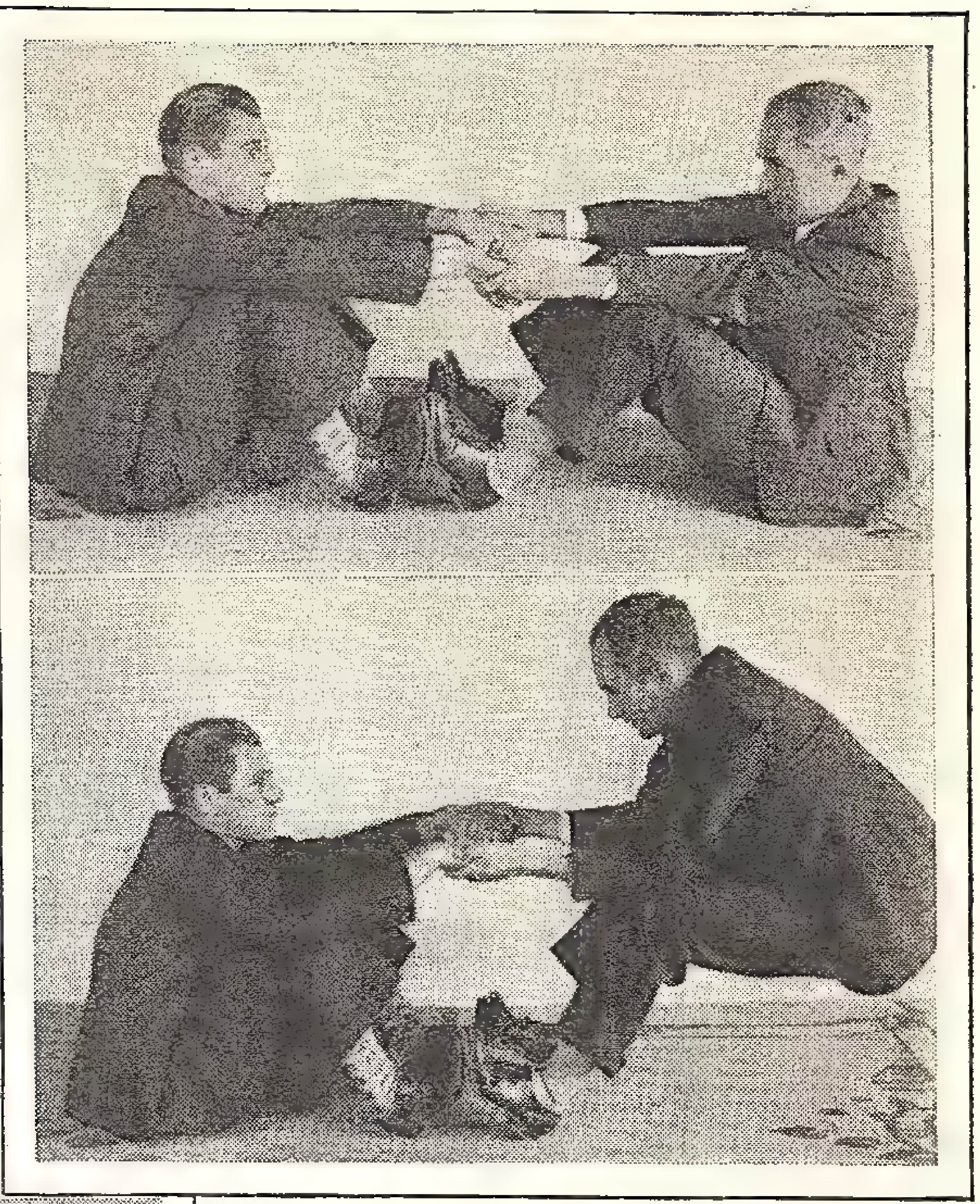
This stunt is similar to the one shown in the upper left hand corner of opposite page except that contestants are standing, with knees touching.



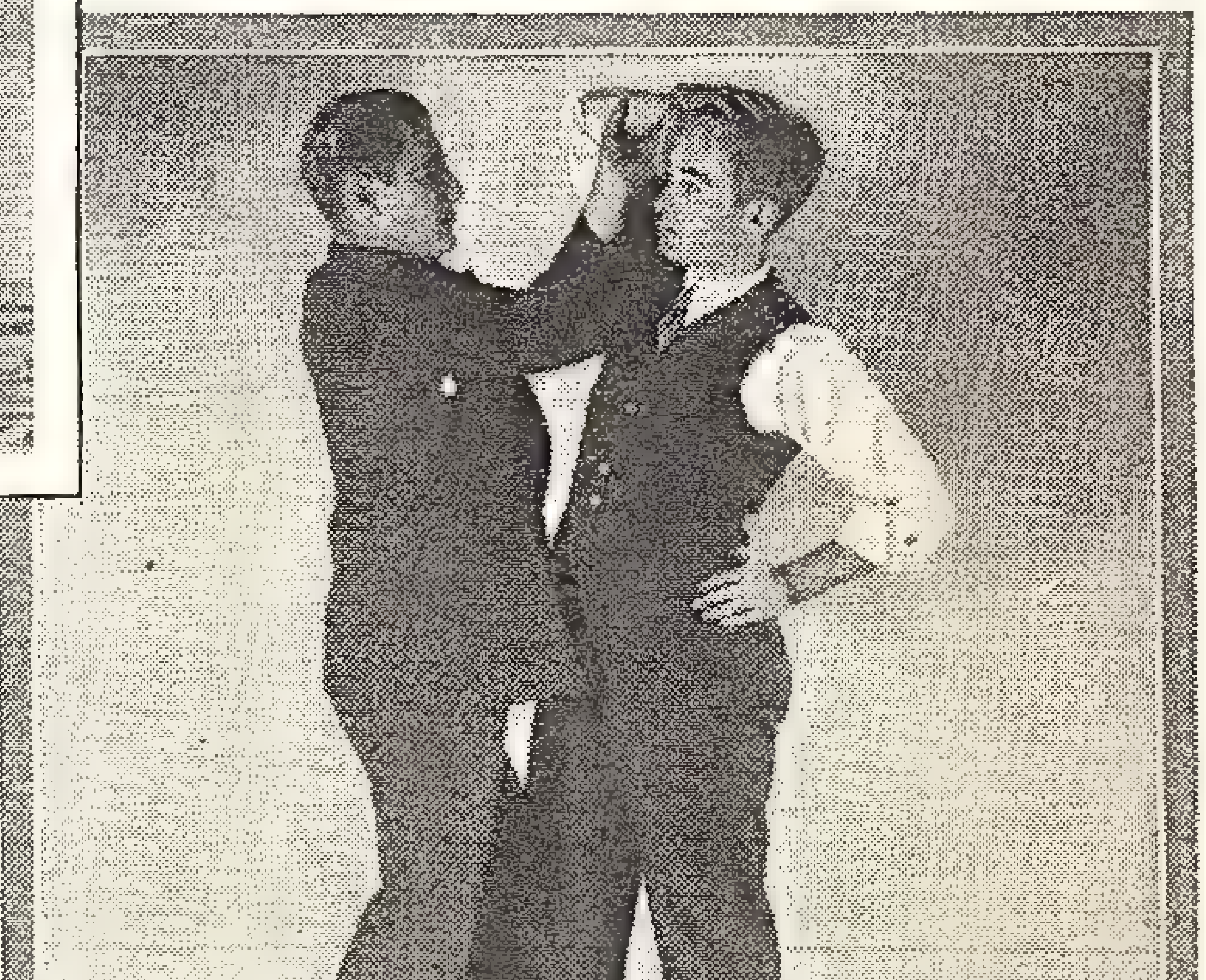
Participants stand with knees together and right arms grasping each other's elbows. The left hands are held behind the back. It is usually quite a struggle before one or the other of the two contestants is pushed off balance.

determined faces. Strangely enough, to the onlookers but not to the Easterner, the miner was finally overcome. The winner had developed his arm muscles and knew how to use them to the best advantage, something neglected by the miner.

Master these tests and then introduce them at your next party. You will be surprised at the amount of fun derived by the participants as well as the onlookers. Most of the guests will not be familiar with them, and so will meet on equal ground.

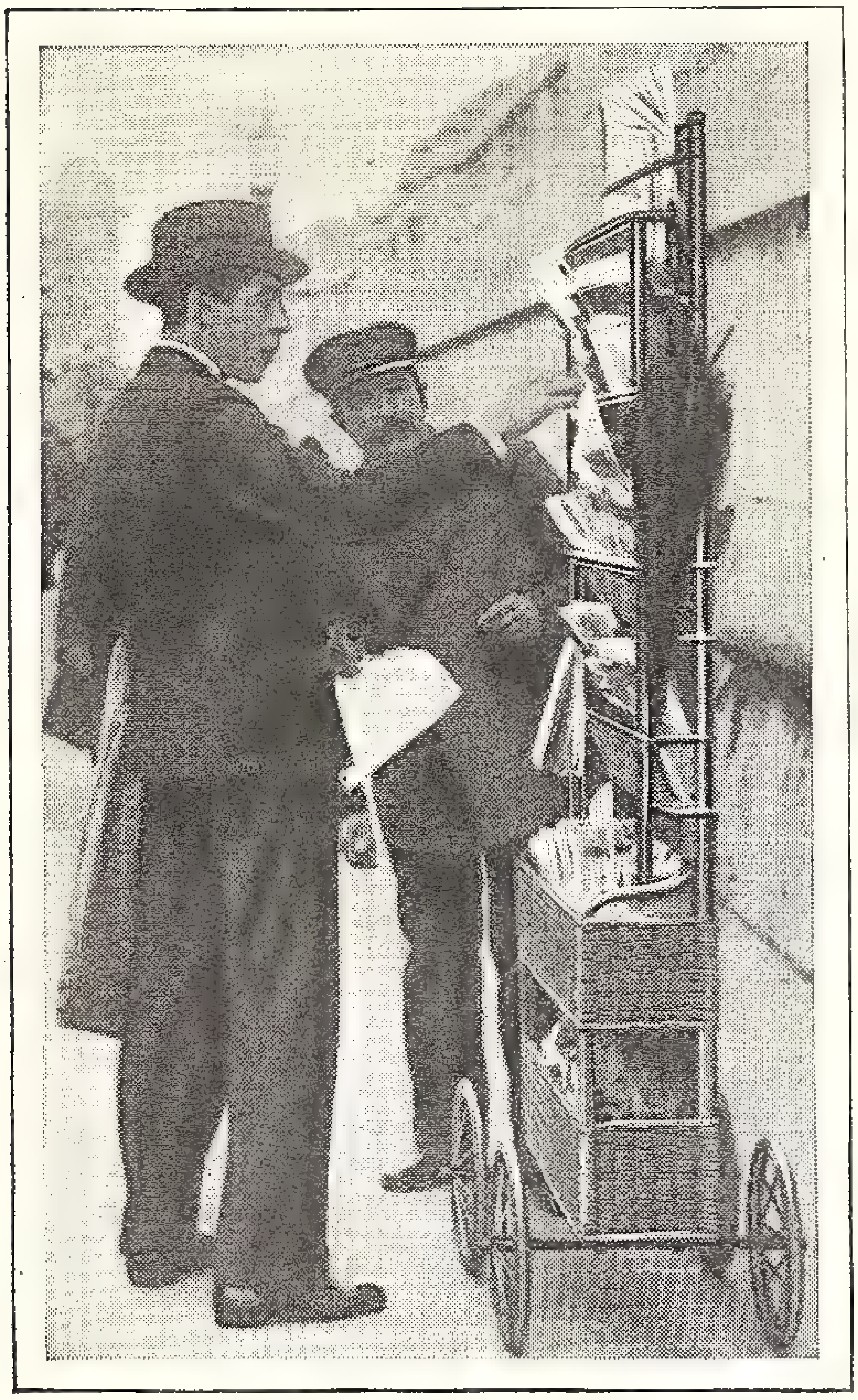


Another good party stunt, one that requires power in the arms, is shown in the two views above. Participants sit on the floor; legs upraised, toes touching and hands clasping. At a signal, they exert all of their strength in an effort to lift the opponent off the floor. If two persons of nearly identical strength take part, the tugging is fast and furious for some time.



This stunt is the only one that has a trick connected with it. Hold your hand atop your head and ask anyone to lift it off. If you are of equal height or taller than the "lifter," he must take the position shown. The strength in your arm will be sufficient to withstand the strength in both his arms, due to the extremely poor leverage.

Perambulating Magazine, Paper Stand Boosts Business

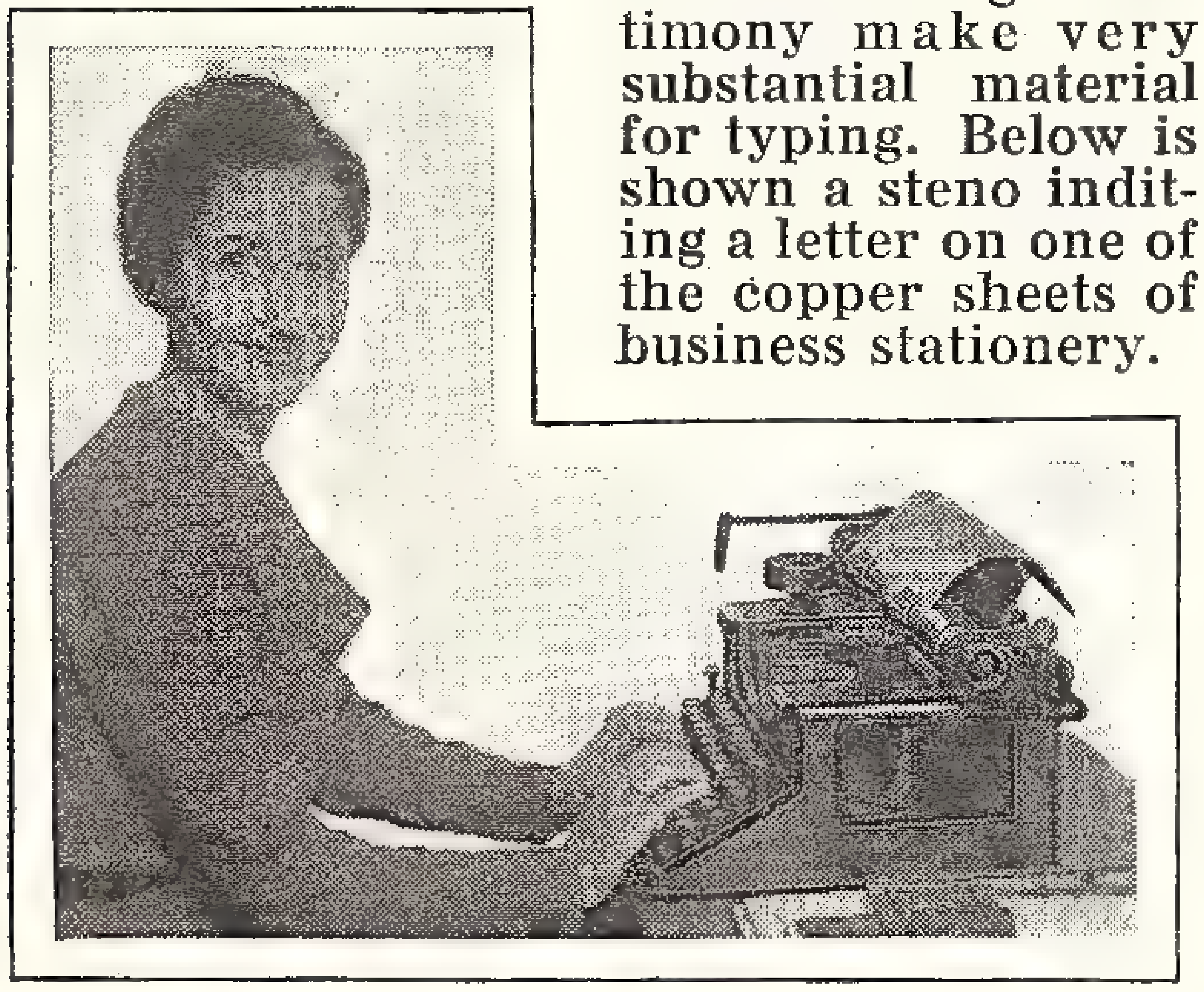


Paris newsdealer vends magazines from this ingenious perambulating rack built up on the chassis of a toy wagon.

A MAGAZINE stand devised by an ingenious Paris paper and magazine seller holds a helpful hint for dealers in this country. As illustrated at the left, the stand is built up on the chassis of a toy wagon. The rack holding the magazines can be of any design you wish. The chief advantage of the contrivance is that it can be shifted to whatever corner is busiest. A tongue on the front gets itself pulled when you are ready to move.

Write Letters on Copper "Paper"

ARIZONANS have thought up a clever idea for getting rid of the surplus copper mined in the state. They are making the metal do duty as paper, and writing business and personal letters on it. The sheets are one-thousandth of an inch thick, and according to testimony make very substantial material for typing. Below is shown a steno inditing a letter on one of the copper sheets of business stationery.



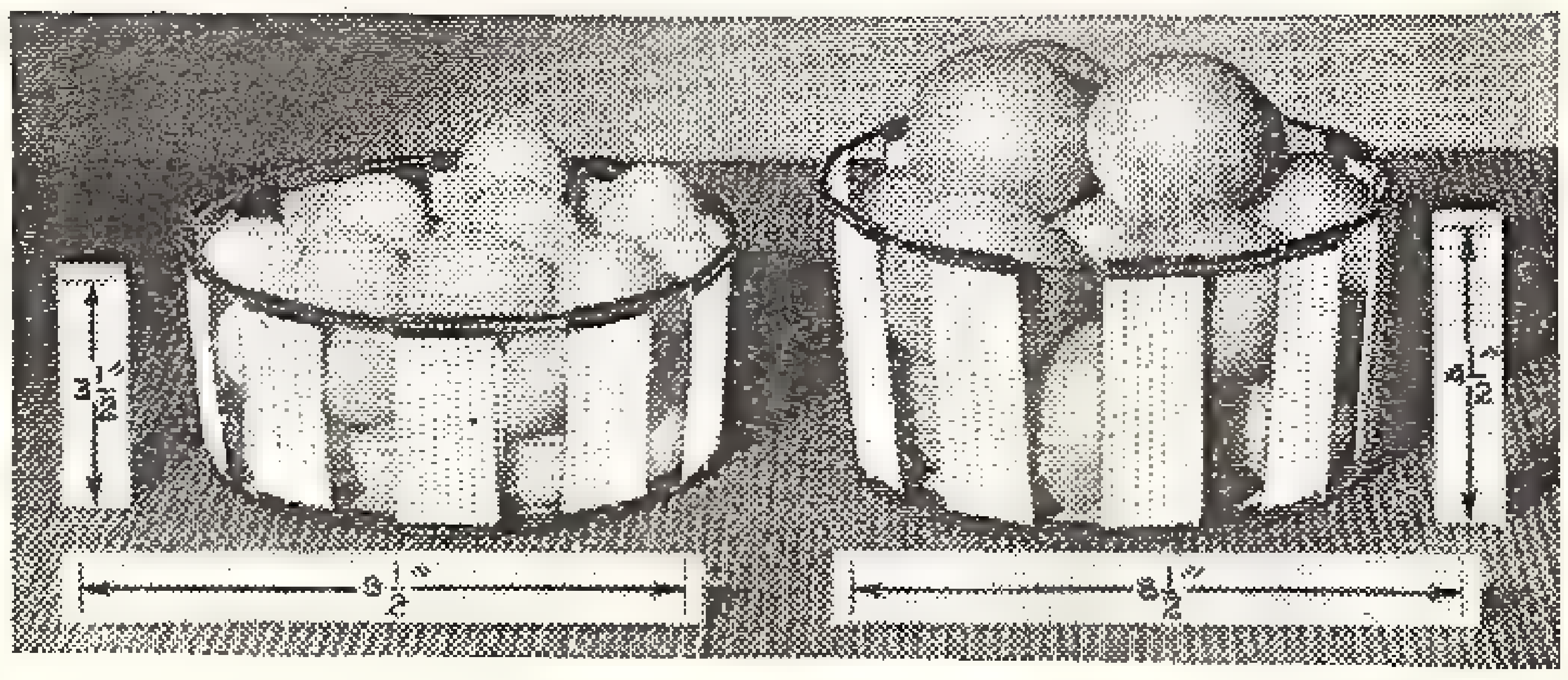
Business and personal correspondence is being written on sheets of copper one-thousandths inch thick to utilize metal.

New Germ Found in Musical Horns

HARMLESS germs which may masquerade as germs of tuberculosis have been found in the metal mouthpieces of horns which musicians play in bands or orchestras. The germs are believed to get into these mouthpieces from the mouths of players who have drunk water taken from unclean faucets. The close association with moist metal is believed to be one condition for the germs' growth, their chemical constitution apparently being stimulated by contact with metal.

Tray Helps Preserve Eggs, Fruit

EGGS and fruit are preserved much longer in a new tray that has recently been introduced especially for use in mechanical refrigerators. These trays, shown below, are round so that they cannot be pushed into corners to shut off circulation. The sides, you will notice, are in strip form, so that plenty of room is afforded for air circulation.



Plenty of space for circulation of air is allowed in these trays, especially designed for use in electrical refrigerators.

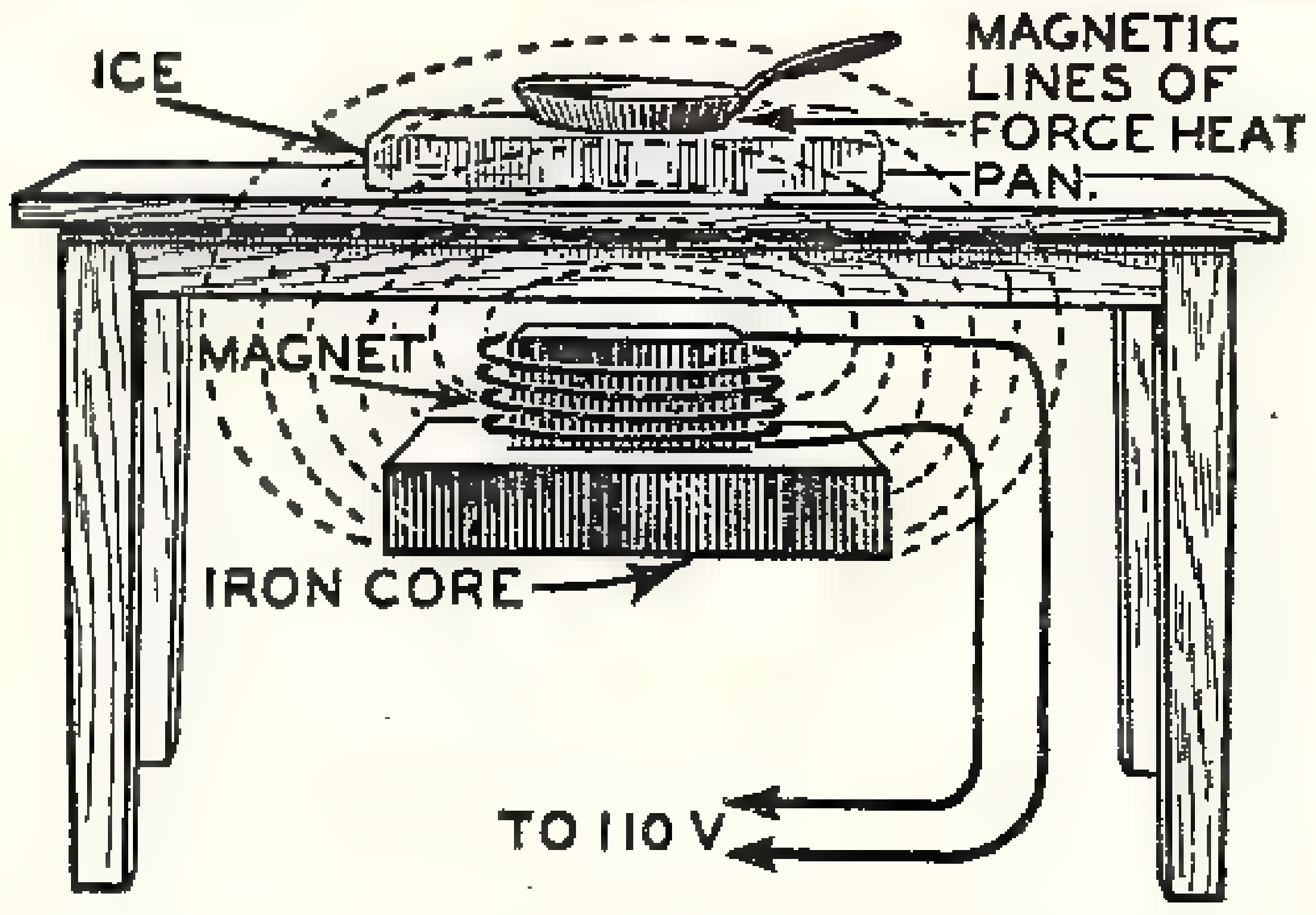
Lower Voltages for Home Safety

A COMPLETE revolution in the home use of electric power, both in the interest of economy and to do away with the increasing number of fatal shocks from electric wires, is being urged in Europe, involving the substitution of lower electric voltages for the 110 volts or 220 volts now commonly used. Many accidents would be avoided and household electric devices such as switches, lamp sockets, safety fuses and so on could be both cheaper and more lasting. These savings might pay for the cost of changing from the present system. 110-220 volts is used to save copper. Much larger wires would be needed to carry the same power at low voltages.

Fool Your Friends by Frying Eggs Over Small Cake of Ice

BELIEVE it or not, but the man in the photo at right is frying eggs over a cake of ice. The eggs are fried in a minute's time and the ice doesn't even melt. Here is how it is accomplished:

Beneath the table is a "T" shaped iron core. There are 120 turns of No. 6 wire around the core. On alternating current of 150 volts, 90 amperes is used to build up the magnetizing force. This sets up a strong magnetic field which penetrates the table and the ice. By placing the aluminum frying pan in the magnetic field, the pan becomes as hot as if it had been heated on a stove. A tremendous current is built up in the metal to heat it.



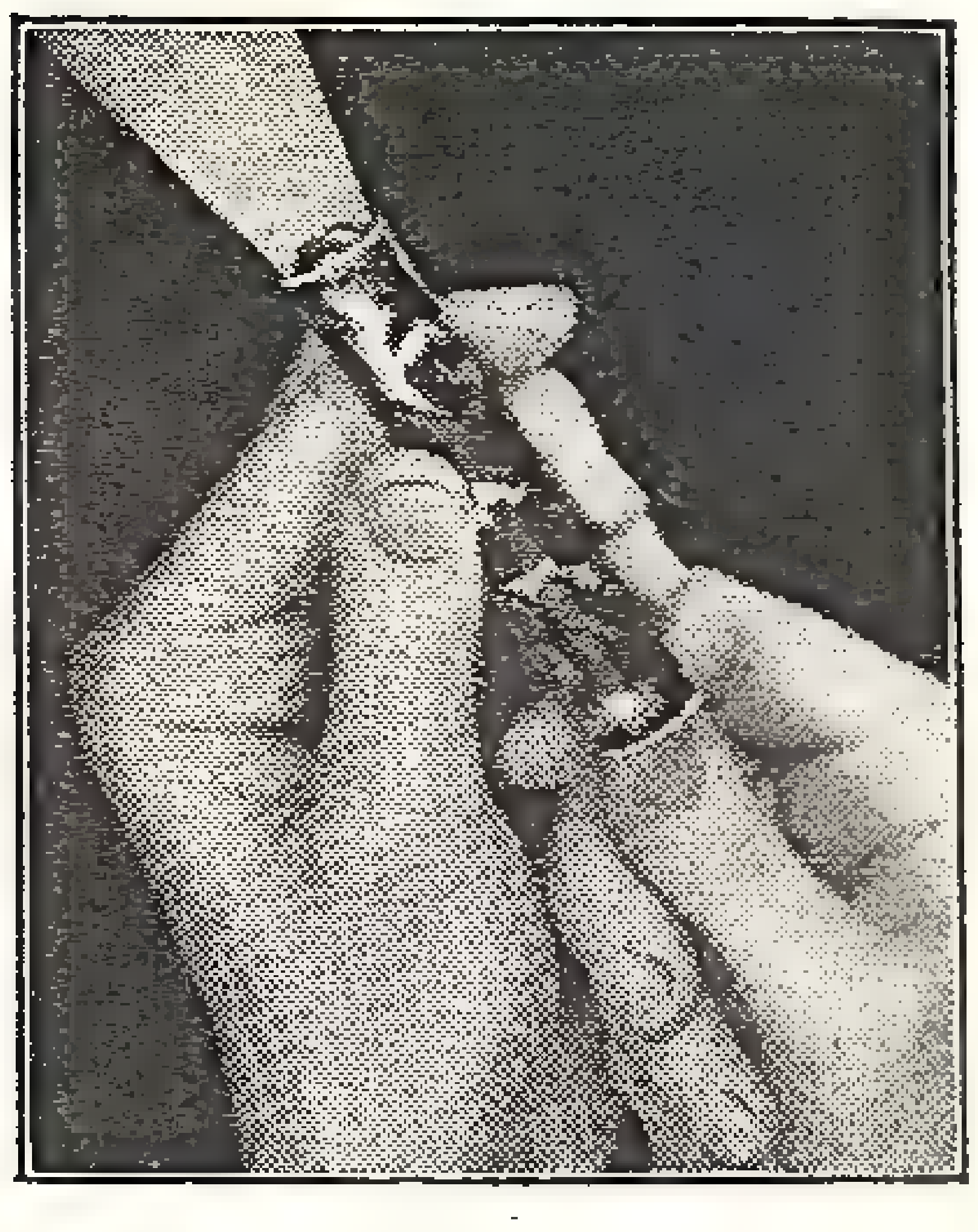
Eggs are being fried over a cake of ice in photo above. The drawing at the left shows how this is accomplished. The iron core beneath the table has 120 turns of wire. On alternating current of 150 volts, 90 amperes are used. This sets up a strong magnetic field which penetrates table and heats the pan.

Trunks Equipped With Wheels

AN age-old inconvenience that everybody has put up with for years has been eliminated by a recent invention by a London, England, man. The device is a trunk with a wheel on it, permitting the trunk to be hauled about as easily as a wheelbarrow.

During recent years, shortage of servants and the high cost of human labor has increased the need for more easily movable objects. One person can tip up a trunk with this new invention and wheel it anywhere with relatively little effort. The device does away with the back-breaking job of moving a trunk to different places within the house as well as saving a tidy sum when an expressman values his services too highly. Any adult can easily handle the device.

A Flashlight for Milady's Purse

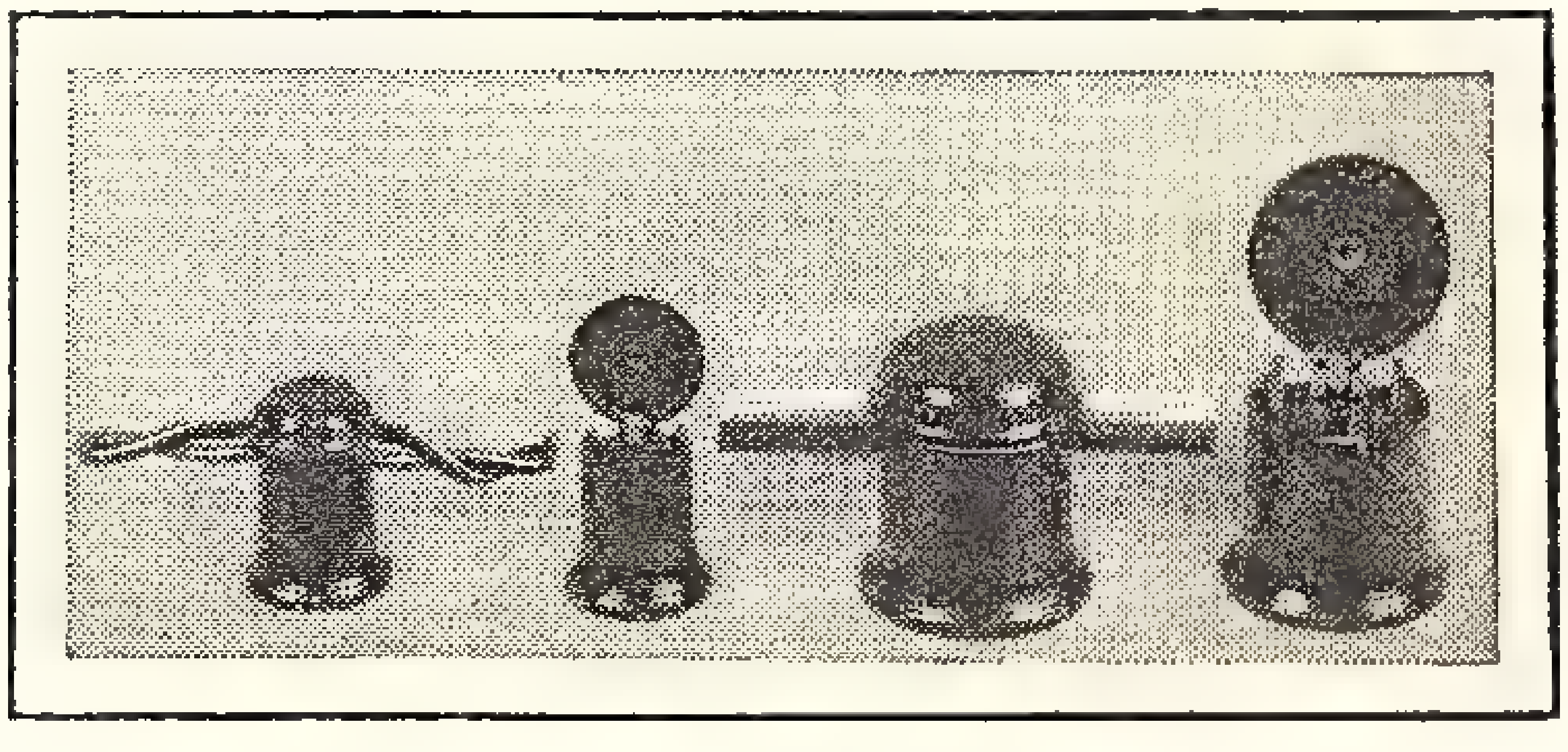


Here is a flashlight that is handy for women as it will fit conveniently inside their purses.

WOMEN will be especially interested in the handy little flashlight shown in accompanying photo. It is called a "Purse Light," a name received because of its extremely small size, which permits carrying conveniently inside a woman's purse. The diameter is about the same as an ordinary pen, although in length it is a bit shorter. A very small battery inside generates power for a pencil light, which is turned on by pressing the opposite end inward with the thumb or finger. The gadget is handy for locating doorbells, keys, keyholes, etc., at night. The "Purse Light" is now on the market and has proven very popular with customers.

Sockets Attach Anywhere on Wire

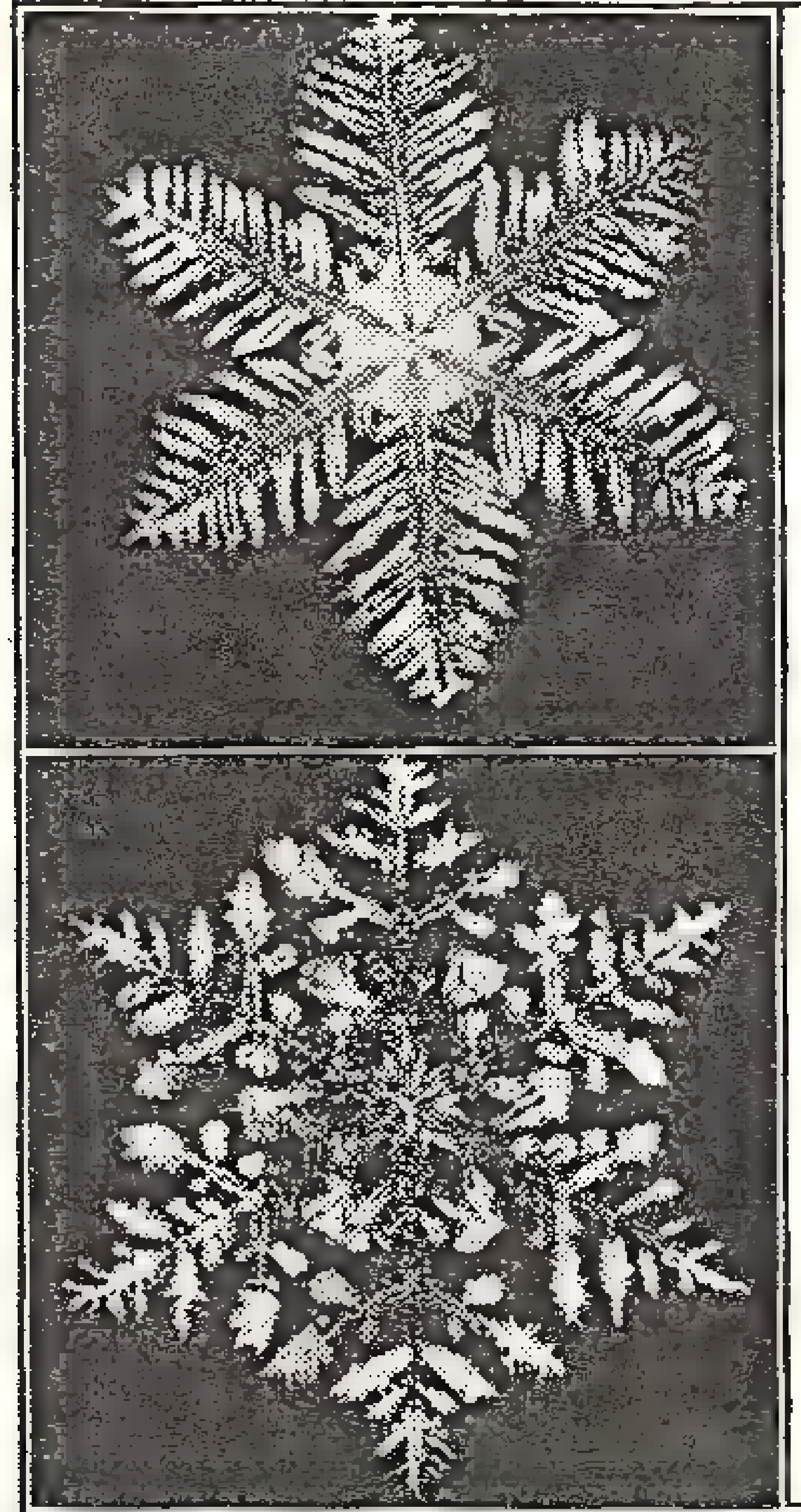
A NEW type electric-light socket, available in two sizes, can be applied directly to the stranded wire without stripping the insulated covering. Connections are made without the use of either tape or solder merely by screwing together the two pieces of the socket; one section containing grooves in which the wires are placed and then screwing the cap down tightly, whereupon two strong pins pierce the insulation and make a positive contact with the conductor. The sockets are very convenient for making up illuminating display sets for outdoor or indoor use.



The two sizes of the new type electric-light socket are shown above. They can be applied anywhere on the wire.

SNOWFLAKES—*Artistic*

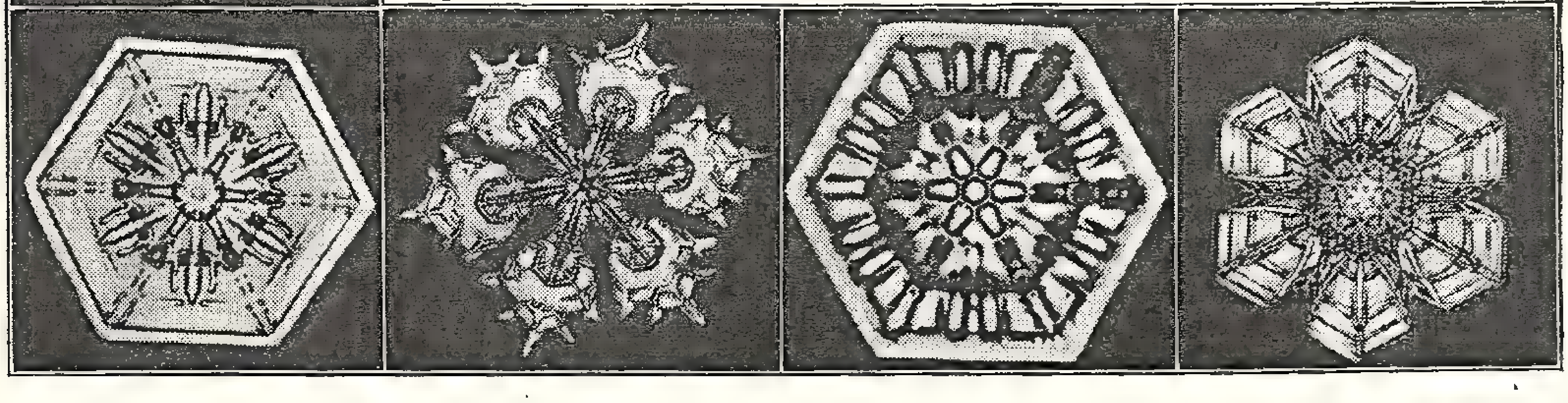
In this record precipitation in Chepstow, England, two inches of snow fell in two minutes.



IF YOU have seen snowflakes an inch, or even three-quarters of an inch, across, come fluttering down from the clouds during a snowstorm, you have witnessed an interesting spectacle. However, you need not feel too much elated for, as the saying goes, "You ain't seen nothin' yet." Sometimes the pearly gems of frozen moisture come down in such sizes that a single snowflake will cover a good-sized saucer.

Sounds fishy, doesn't it? Nevertheless, it is no fish story. Such phenomena have been witnessed and recorded by reliable scientific observers in various parts of the world. E. J. Lowe, of Chepstow, England, reported three such cases. One was in January, 1838, when the largest snowflakes were about 2 inches in diameter; one was on January 7, 1887, when the largest snowflakes were more than 4 inches in diameter; and the third was on March 24, 1888, when the largest snowflakes were nearly 4 inches in diameter.

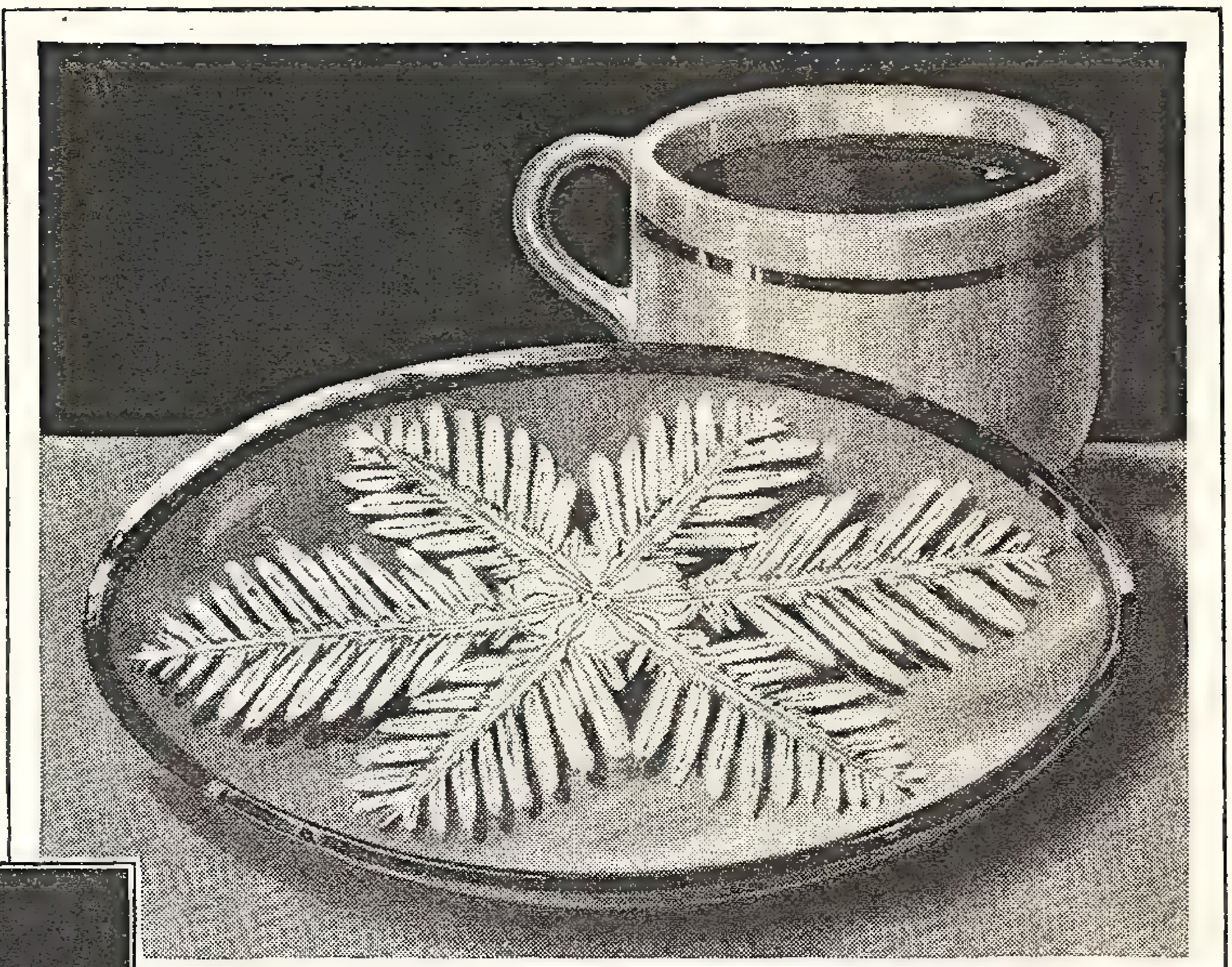
So far as can be found the 5-inch snowflakes which fell at Nashville, Tennessee, on January 24, 1891, were the largest real



Few of the myriad fantastic geometrical shapes which snowflakes assume as they fall from winter skies are shown in these artist's drawings. These flakes may be perfect, single snow crystals; as, for instance, during the beginning of a snowstorm when the air temperatures are well above freezing. More often, however, they are groups of several partly melted snow crystals which have come together and adhered to each other during their journey through the clouds. Note that all the patterns are six sided. Being minerals, snow crystals follow the laws of crystallography.

Masterpieces of NATURE

Take a good close look at a snowflake some of these days and you'll be surprised at what you see. Geometrical patterns that no artist could design will greet your eyes. This fascinating story will tell you some astounding facts about these snowflakes—how they are formed and how they sometimes attain to gigantic sizes.



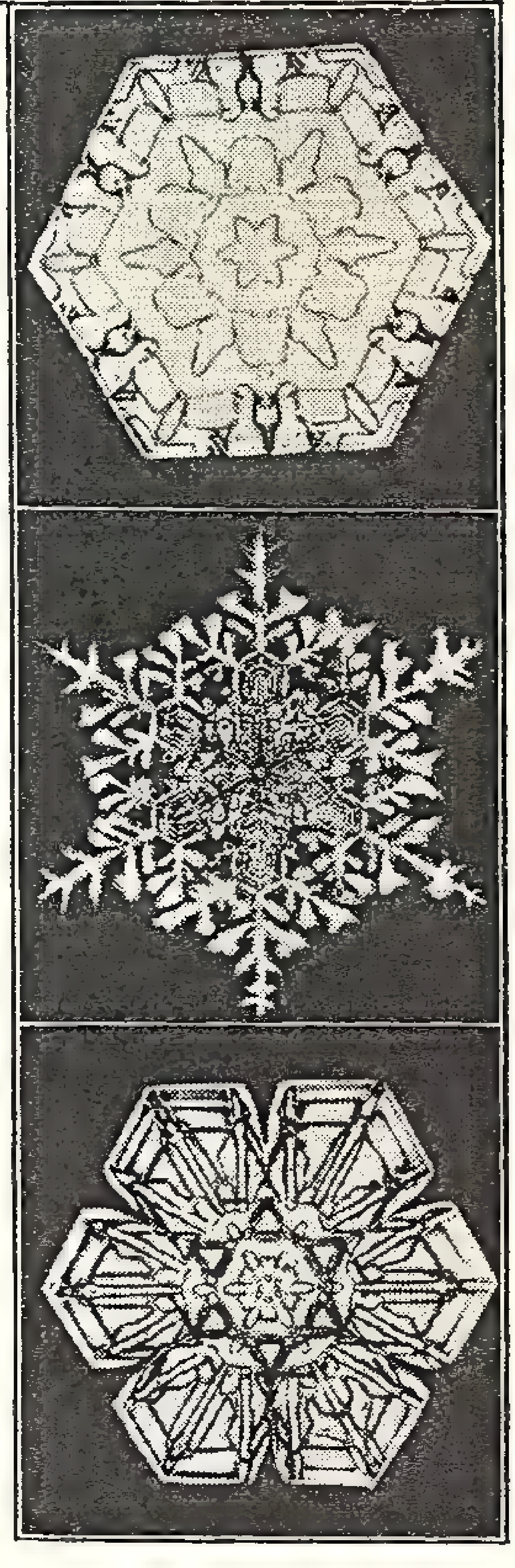
Maybe you won't believe it, but snowflakes five inches in diameter, almost as large as a saucer, have actually come down out of the skies. This phenomenal occurrence was recorded at Nashville, Tenn., on January 24, 1891. Gigantic snowflakes are simply masses of snow formed by the collision and adherence of many small snow crystals. Two or more of these crystals unite near the cloud level, forming a large snowflake which intercepts others as it falls to the ground, gradually becoming larger on its way earthward. Due to air friction, edges curl up causing saucer-like shape.

snowflakes which have been authentically recorded up to the present time.

Gigantic snowflakes, like those that fell at Chepstow, are simply masses of snow formed by the collision and adherence of many small snow crystals. Two or more small snow crystals unite near the cloud level, forming a snowflake somewhat larger than its neighbors. This snowflake intercepts others as it falls toward the ground, gradually becoming larger and larger on its way down. Due to the friction of the air, which tends to retard the falling motion, the edges of the snowflake often curl up, causing the characteristic saucer, or plate-like, shape.

Although the terms "snow crystal" and "snowflake" are often used synonymously, there is a real distinction between the two. Snow crystals are formed when the invisible atmospheric moisture condenses during air temperatures below the freezing point.

One interesting thing about snow crystals is that they are always six pointed or six sided. Snow crystals are minerals, just as diamonds are minerals. Consequently, when moisture condenses into snow it follows the laws of crystallography, just as other minerals do. Mineral substances crystallize during the solidification process whenever the molecules are free to move about and arrange themselves according to mathematical laws. In the case of snow this arrangement is always hexagonal or six sided. Anyone who has ever thrown snowballs knows that it is only the damp snow particles that cling together when their surfaces come in contact. Cold, dry snow crystals do not adhere when they collide.



Here are few more more shapes which flakes assume. These designs often provide artists with patterns for dresses, etc.

Artificial Radio SIGNALS

AN INEXPENSIVE and compact device for training flyers to pilot planes by radio beacon and to effect blind landings has been perfected by Lieutenant Carl J. Crane, Randolph Field, Texas, flying instructor and noted authority on blind aerial navigation.

Under actual flying conditions the invention has proven successful in both Army and civilian tests.

By simulating radio beams, the newly perfected device is used to work out almost any problem in connection with flying by radio beacon or making blind landings by means of electrical signals emitted from the airport of destination.

Construction of the Instruments

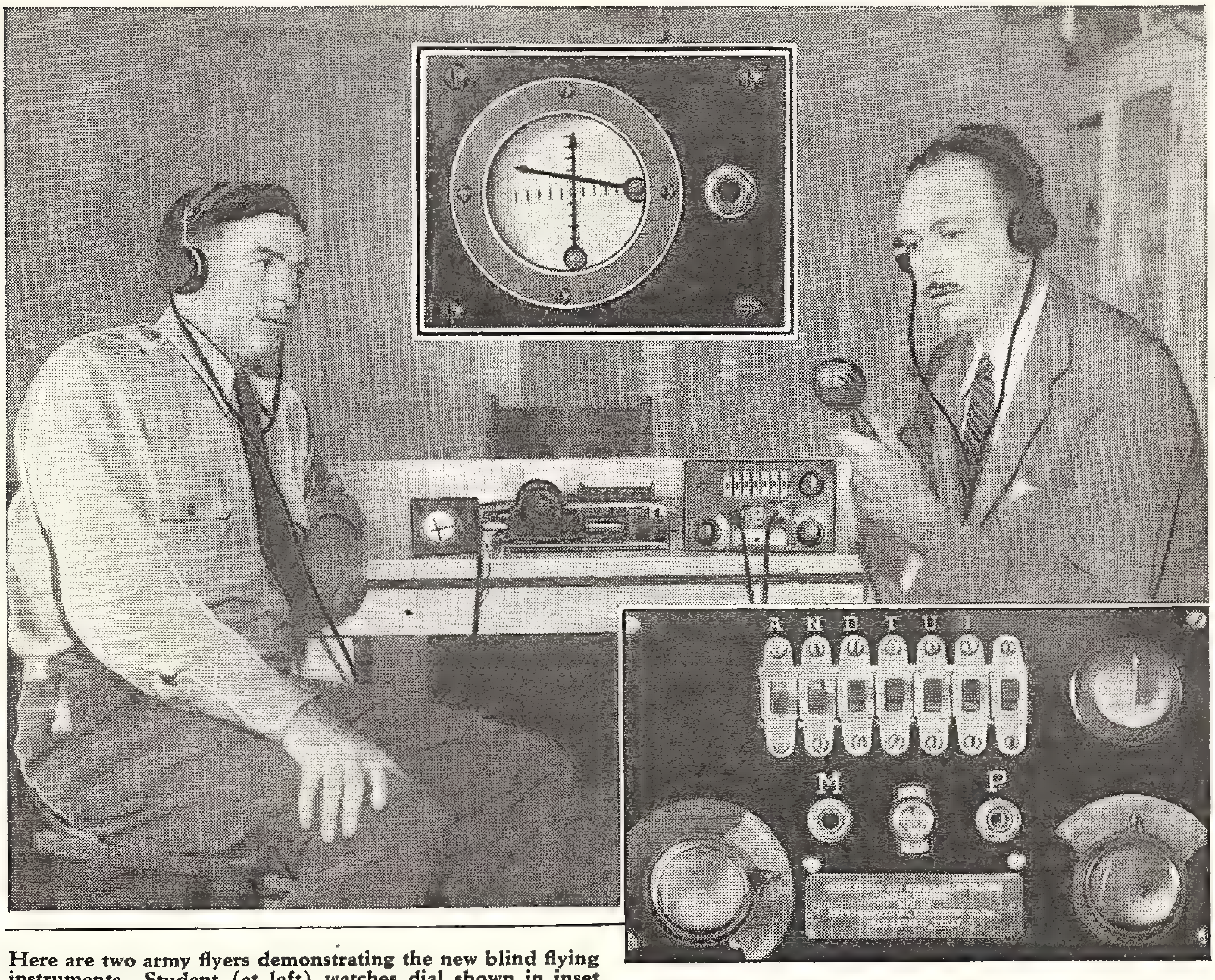
Seated in the open cockpit, the flying instructor has before him a panel (about 5x7 inches) upon which are mounted seven switches and three dials. The instructor and his blind-flying student, who operates the controls of the plane under a sight-tight hood in the other cockpit, are connected by a telephone into which the teacher advises his pupil throughout the course of instruction.

The only instruments necessary for the student are a set of earphones and a small dial with two pointers, swinging from pivots on the right side and the bottom, which cross at right angles over the center of the dial. This indicator is used in training the student in the Department of Commerce method of making blind landings.

How the Device Operates

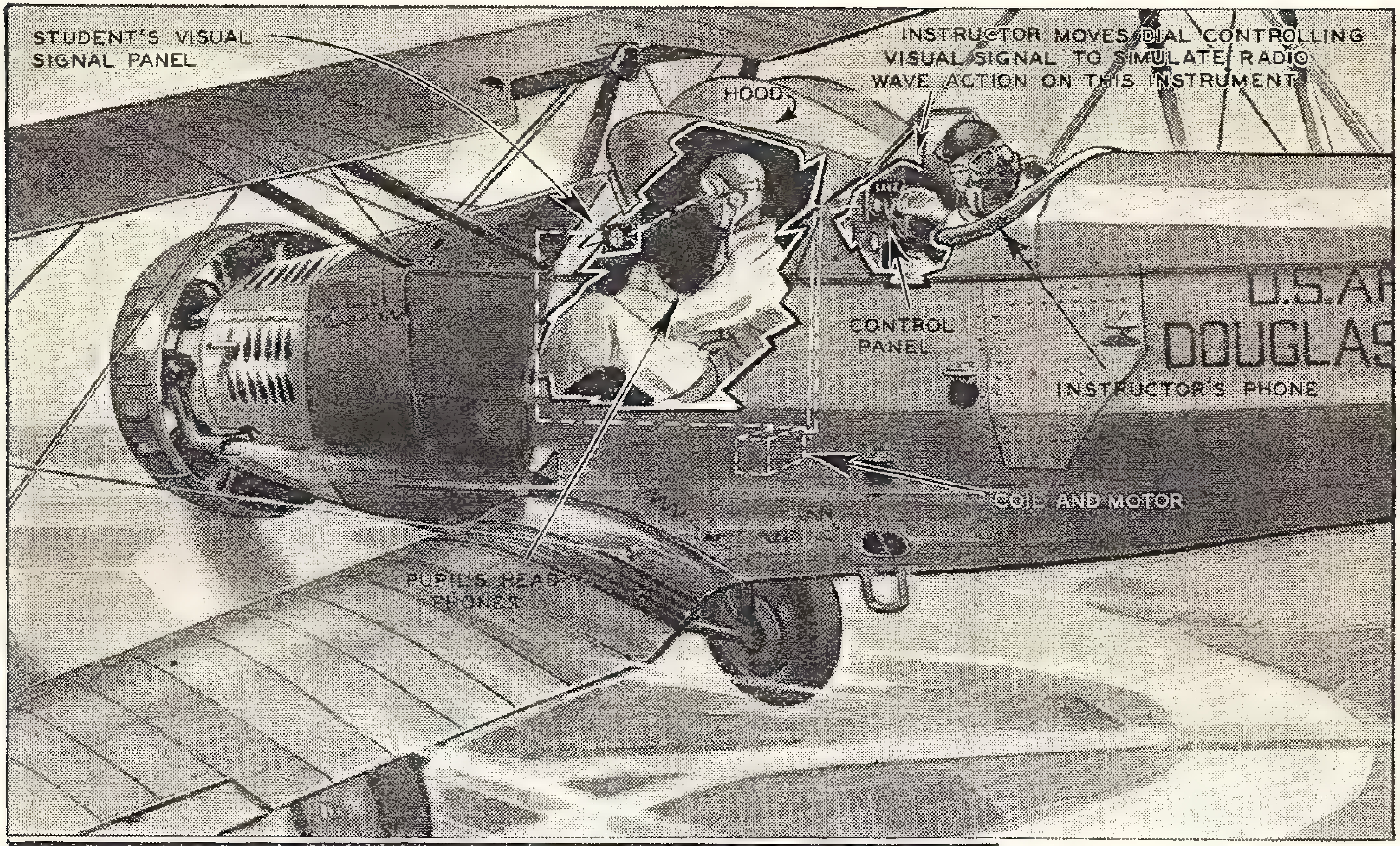
In this method, a system of energized circles around the center of the airport emits radio signals which move the pointers of the dial. The vertical pointer, showing the course, and the horizontal indicator, which points out the "too-high" or "too-low" position of plane, are both operated by the instructor.

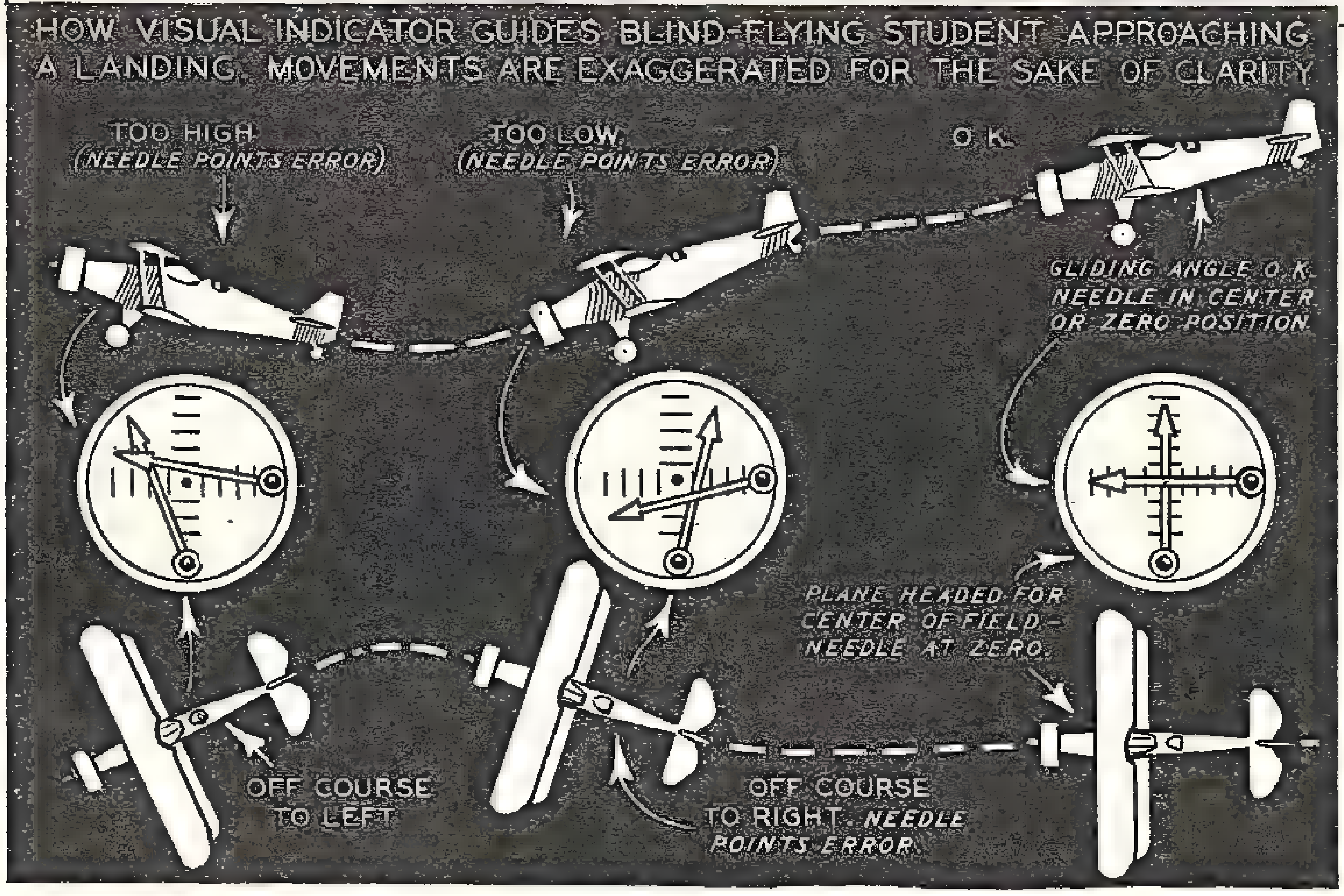
"Although blind landings for regular commercial or military planes are still in the experimental stage, it will not be long before all pilots will be able to qualify in the new art, just as they will soon be required to make their mark in flying blind," Lieutenant Crane declared while being interviewed by the MODERN MECHANIX AND INVENTIONS representative.



Here are two army flyers demonstrating the new blind flying instruments. Student (at left) watches dial shown in inset to learn whether he's off course. Instructor at right operates control dial (shown below) to show student direction ship is flying with relation to landing field. Instructions are given through the mike—Photos courtesy U. S. Army Air Corps.

Teach Blind Flying Safely


STUDENT'S VISUAL SIGNAL PANEL
INSTRUCTOR MOVES DIAL CONTROLLING VISUAL SIGNAL TO SIMULATE RADIO WAVE ACTION ON THIS INSTRUMENT
HOOD
CONTROL PANEL
U.S. AR
DOUGLAS
INSTRUCTOR'S PHONE
COIL AND MOTOR
PUPIL'S HEAD PHONES


HOW VISUAL INDICATOR GUIDES BLIND-FLYING STUDENT APPROACHING A LANDING. MOVEMENTS ARE EXAGGERATED FOR THE SAKE OF CLARITY
TOO HIGH (NEEDLE POINTS ERROR)
TOO LOW (NEEDLE POINTS ERROR)
O. K.
GLIDING ANGLE O. K. NEEDLE IN CENTER OR ZERO POSITION
PLANE HEADED FOR CENTER OF FIELD.—NEEDLE AT ZERO.
OFF COURSE TO LEFT
OFF COURSE TO RIGHT. NEEDLE POINTS ERROR

Artist's drawing above shows how blind flying instruction instruments are installed in cockpit of plane. Student in front is hooded, while instructor sits in rear at control panel. Drawings at left illustrate how dial pointers indicate deviation of ship from course leading to landing field. Student steers plane as if needles were being actuated by energized cables from air field. When the instructor sees the student is keeping on the predetermined course, he throws switch which causes a long dash to sound in ear phones. Should the novice get off course to the right a dash and dot sounds, to left, a dot and dash, until the ship's nose is pointed towards the runway. These signals duplicate those heard from airway radio beacons. Lieut. Carl J. Crane, of Randolph Field, Texas, is the inventor.

Radio beacon signals, by which the student knows whether he is on the course or to the left or right of it, are also simulated on the Crane Beacon and Blind-Landing Trainer.

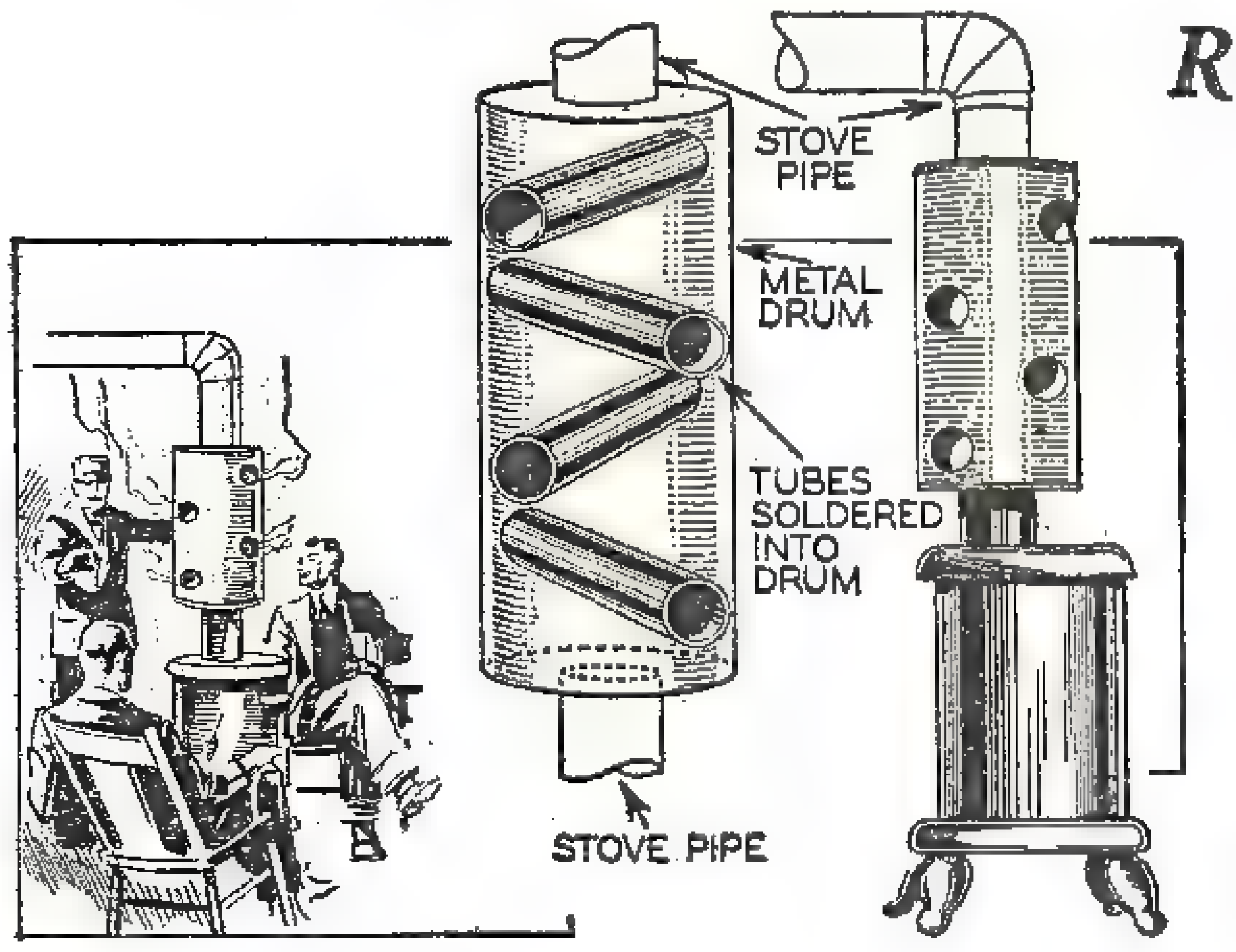
When the instructor sees the student is keeping on the predetermined course, he throws the "T" switch which causes a miniature coil operated by a motor to sound a long dash at regular intervals in the pupil's earphones. Should the student get off the route to the right, the man behind the panel in the open cockpit immediately sounds the "N" signal (a dash and a dot) until the airplane is headed back in the correct direction.

Should the plane assume a position left of the prescribed course, the instructor switches on the "A" signal, a dot and a dash, until the ship's nose is pointed toward the "airport." The three remaining switches on the panel also serve to orientate the flyer as he comes in for a blind landing.

Lieutenant Crane's invention is expected to be hailed by all airport executives as an ouster of expensive ground equipment and to permit blind flying and landing instruction at every out-of-the-way Army and civilian airport.

HANDIKINKS

When you've got some job on hand to perform look through Handikinks department for a method of carrying it out with greatest ease and minimum labor. You'll be surprised to learn how complex tasks can be simplified.

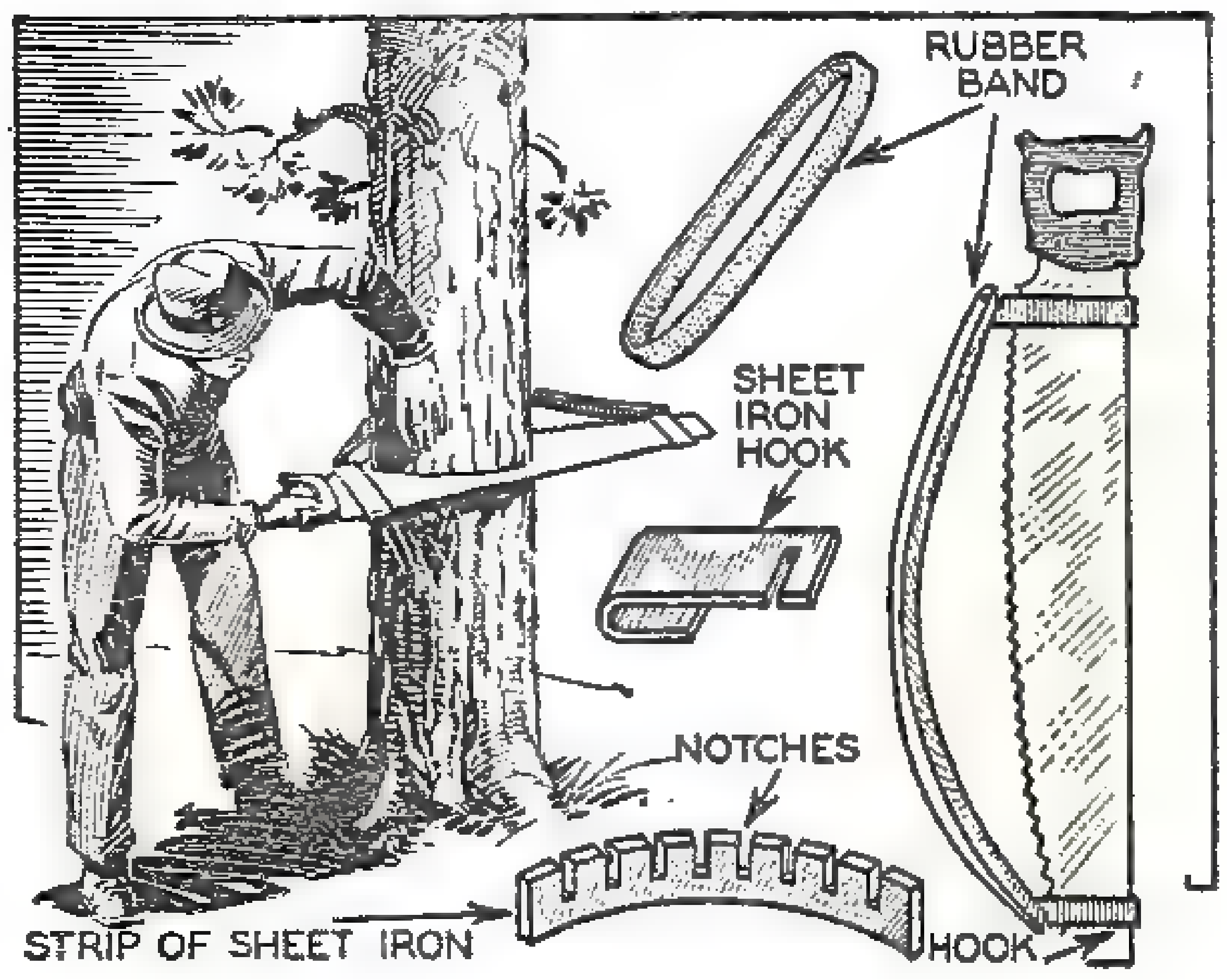


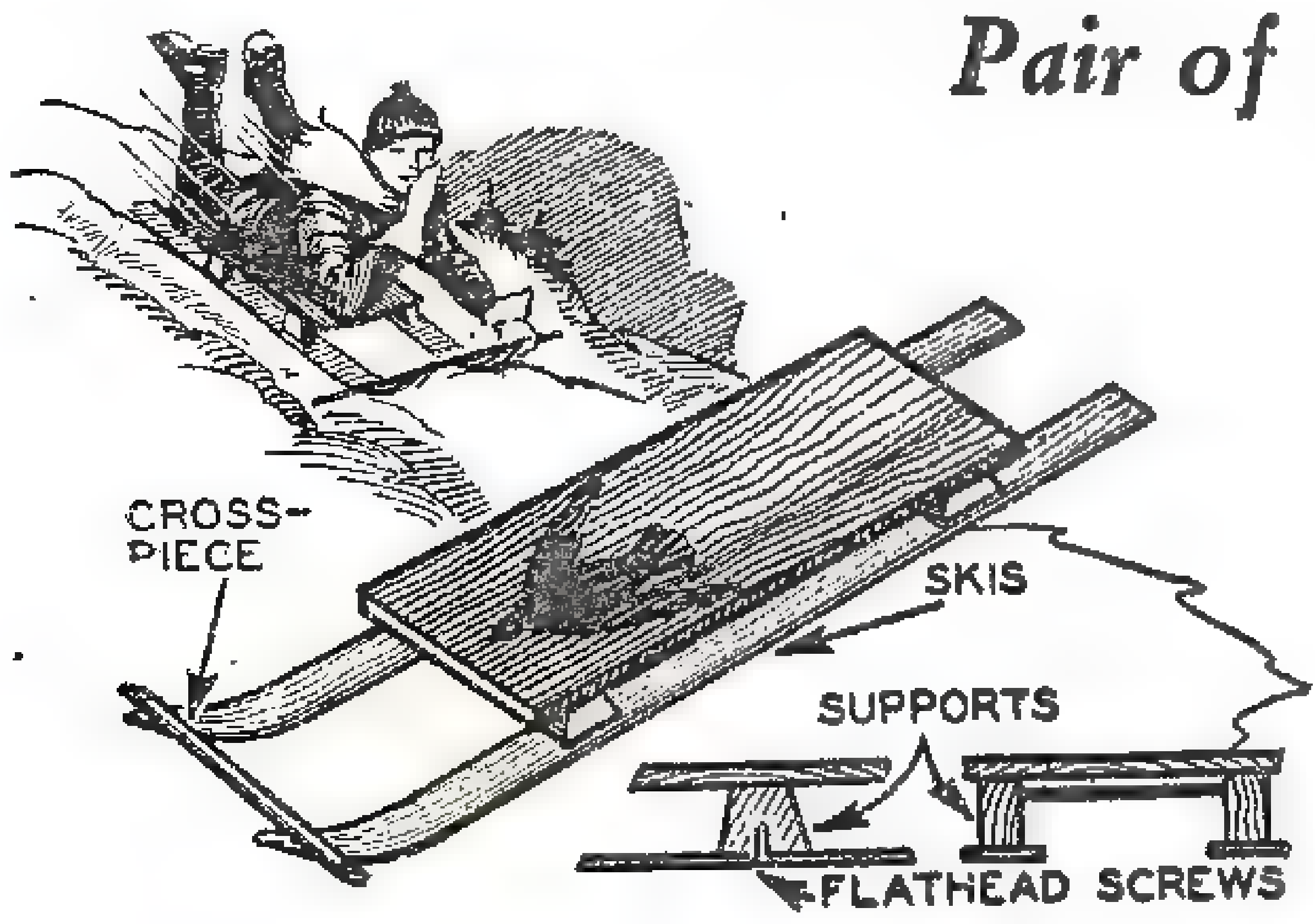
Radiator in Pipe Gets More Heat From Stove

AN OLD Ford gas tank or metal drum, rigged out as illustrated in the drawing at the left, will go a long way towards reducing heat bills. First, solder a number of four-inch pipes in criss-cross fashion in the drum, as shown, and then take out a section of the stove pipe and replace it with the drum. Make sure that you do a good soldering job, so that no leaks develop. With this stunt, heat rising through the stovepipe warms the criss-cross pipes, which in turn radiate a warmth into the room. A few braces on the pipe might be necessary.—Bob Poulson.

Inner Tube Band Helper on One-man Saw

IT'S QUITE a task to saw down a tree with a one-man saw, owing to the pressure the operator has to exert in holding the saw in the cut. This difficulty can be overcome, however, by making two hooks as illustrated at the right. The larger one, the one with the row of notches, fits over the handle end while the smaller one fits over other end. A rubber band is then cut from an old inner tube and hooks into the notches, as illustrated. When the band is around the tree, the saw will be held firmly in the cut, so that your energy can be applied to the back and forth motion.—A. H. Waychoff.





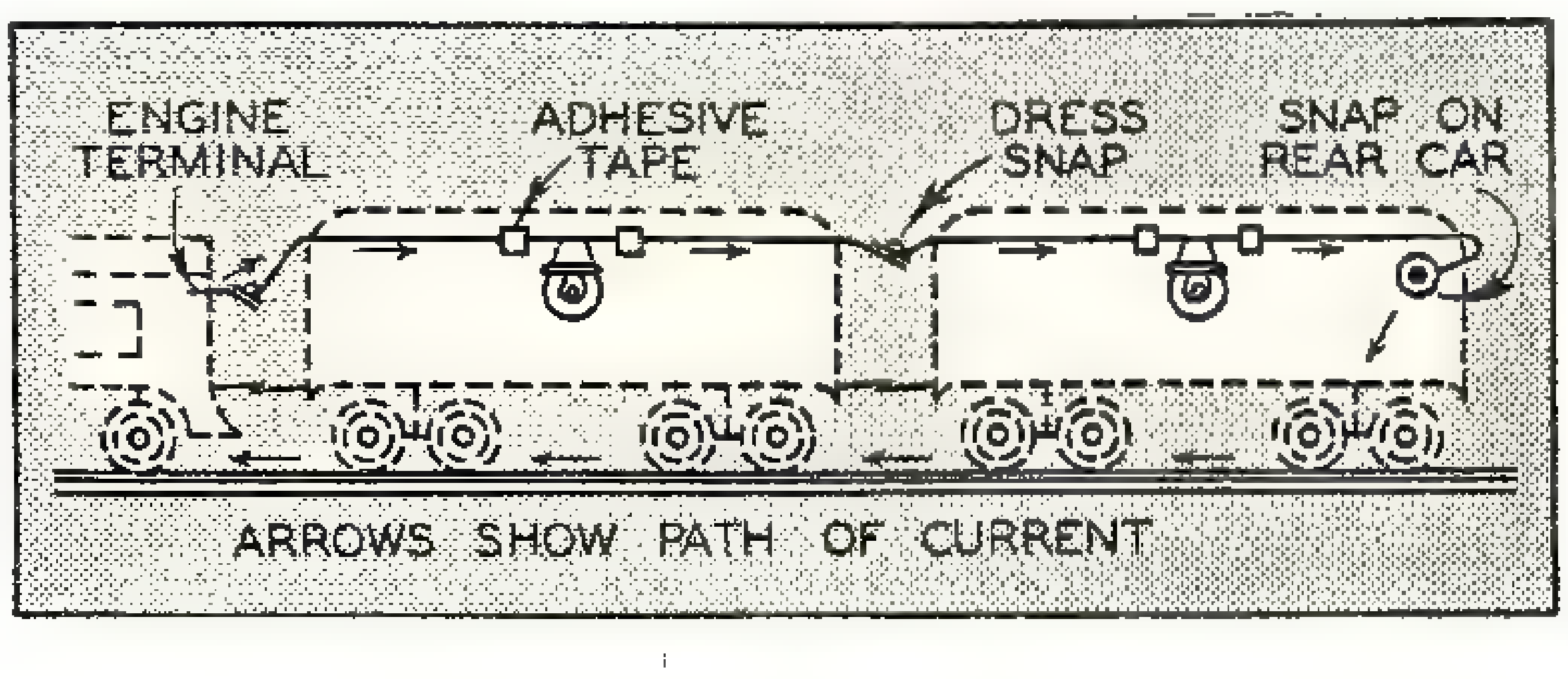
Pair of Skis Makes Runner for High Speed Coaster

MORE enjoyment than tobogganing can be derived from this simple sled, which is made chiefly from an old pair of skis. The seat of the sled should be a flat board about a foot and a half wide and three quarters of an inch thick. It should be mounted on three posts on each ski, which can be fastened firmly by using long flat-headed screws through the runner. A bar across the front of the skis will help in steering, the operation being much like that of the regular flexible flyer.—Ad Williams.

Here's How to Equip Your Electric Train With Simple Lighting System

WANT to equip your electric train with a lighting system? It's an easy job—here's how it's done. First you'll need a gang of Christmas tree lamp sockets. On each end of the cords solder one part of a dress fastener, using one of each kind on each coach. On the rear of the body of the coach, solder another half snap fastener. Make sure that a connection to this last mentioned fastener will carry current taken from the rails by the wheels. Now remove the top of the coach and tape the socket in place, hanging it to any convenient cross-member. Bring one end of the cord through the front vestibule and the other through the rear, and replace the top. Then make some sort of a connection to the third rail contact through the engine. Finally hook up the entire system as illustrated in the drawing, and you are ready to breeze along.

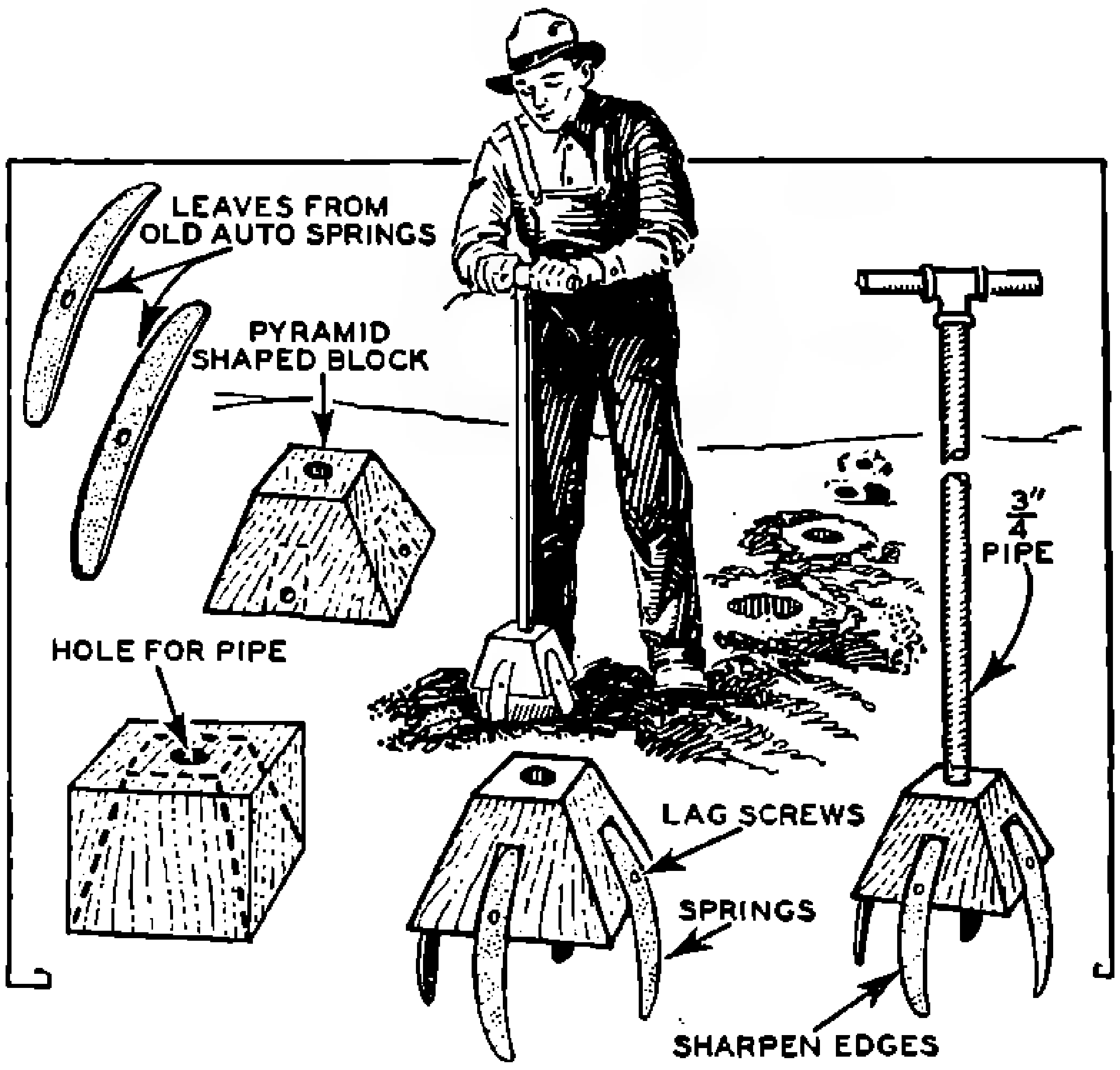
Be sure to wipe the oil from the trucks and scrape the rails to insure a clean contact.—John L. Story.



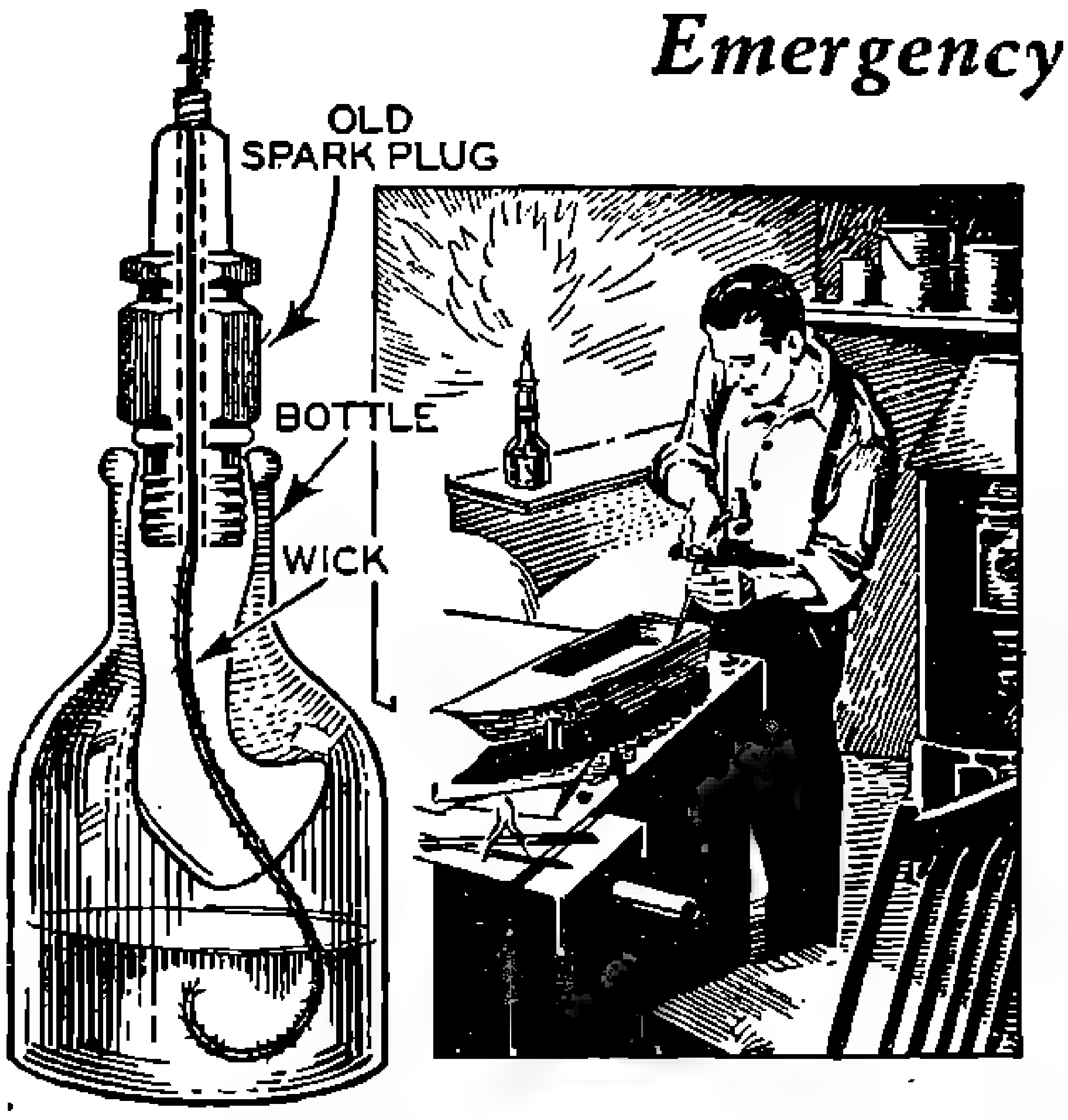
Helpful Ideas for Handymen

Auto Springs Make Hole Digger

AN EXCEPTIONALLY staunch, quick cutting posthole digger can easily be made from the shortest leaves of old auto springs. Your first job here is to cut from a block of wood about 6 in. square a truncated pyramid of the shape shown in the drawing at the right. A slot the width of the springs is then cut off on all sides as shown by the dotted lines to take the leaves of the auto springs, which have previously had their edges ground down to a sharp cutting edge. Fasten the cutters in place with lag bolts. A handle is made by taking a couple of pieces of ¾-in. pipe, assembled as illustrated. A pin run through the sides of the block holds the pipe firmly in place. The digger will work in the hardest ground.—Don Banner.



Emergency Work Shop Light From Spark Plug, Bottle

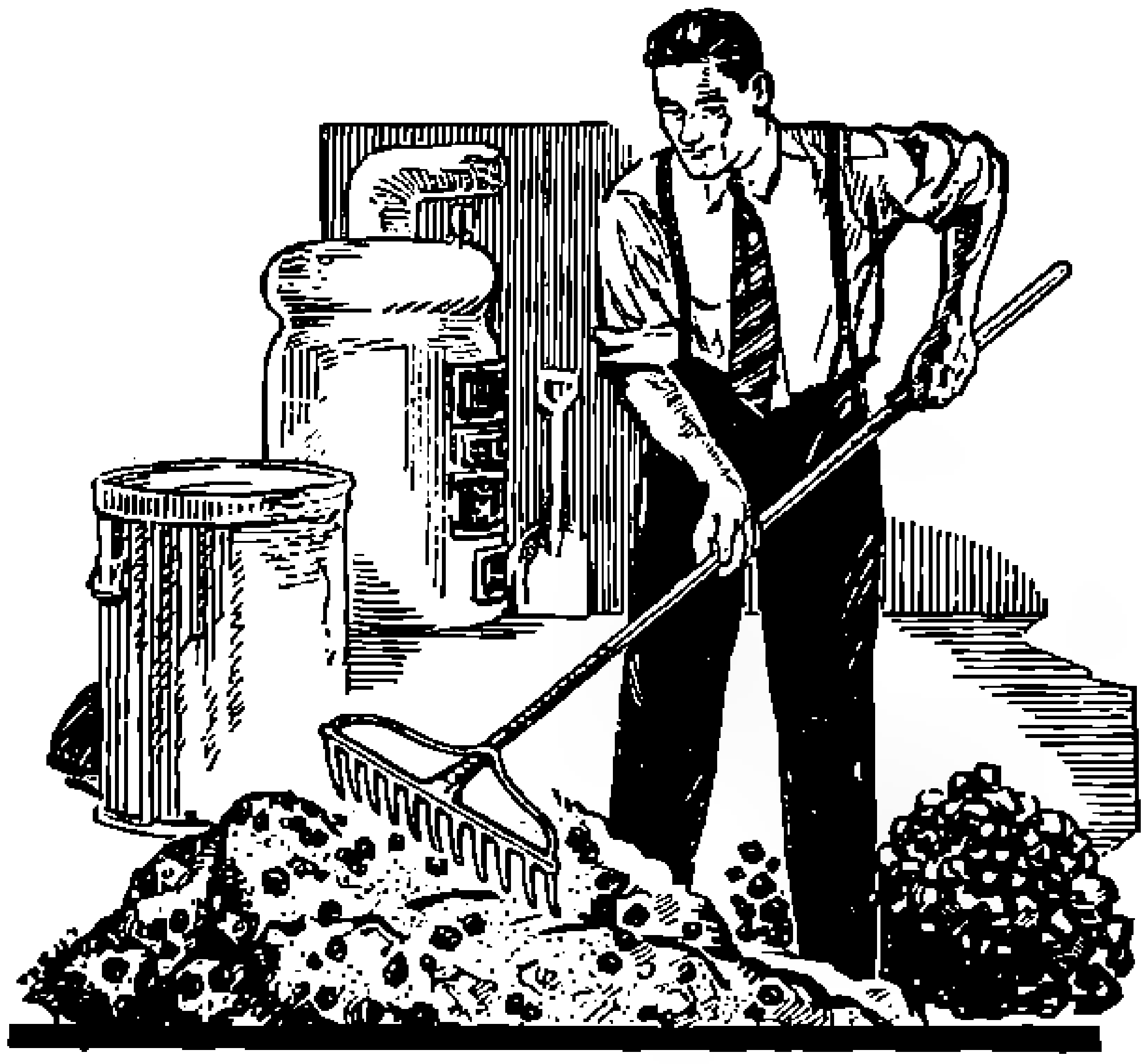


USING only a small-necked bottle, an old spark plug and a piece of string, an emergency light for the home, shop or camp can be speedily rigged up to illuminate whatever you feel needs illuminating. Simply take the old spark plug and remove the top screw and the wire which runs through the plug, leaving only the bottom with the porcelain case. This is then placed in the neck of the bottle or inkwell and a cotton string is pushed through the hole where the wire was. The string acts as the wick. Coal oil is used as fuel. Several of these will give a surprisingly good light.

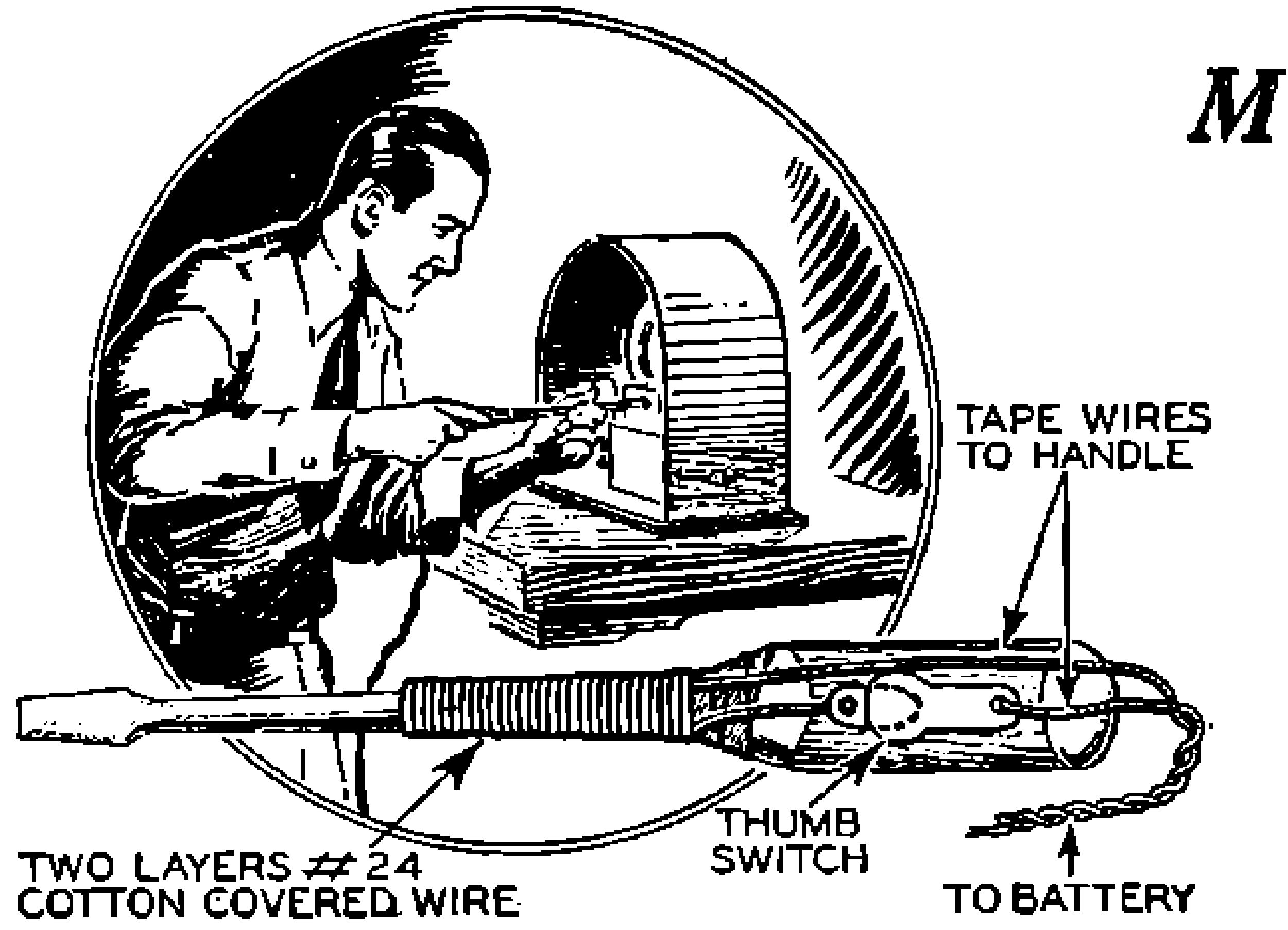
It may be used as a candle by plumbers or as an emergency light when the juice goes off. Even for soldering it will prove helpful where small jobs are to be done.—A. S. Wurz, Jr.

Sift Ashes With Ordinary Garden Rake

DO YOU know that you can sift ashes with a garden rake about as easily as can be done with a professional sifter? When you have a sifting job to do, simply spread the ashes out on a concrete floor and then rake them out thin. The fine ash, of course, cannot be raked, whereas the large chunks can be separated out with the greatest ease. The chief advantage of this method is that it is dustless as compared with the regular shaker method most commonly used. In these hard times you might be able to save quite a bit on your coal bill by the application of this stunt.—W. F. Schaphorst.

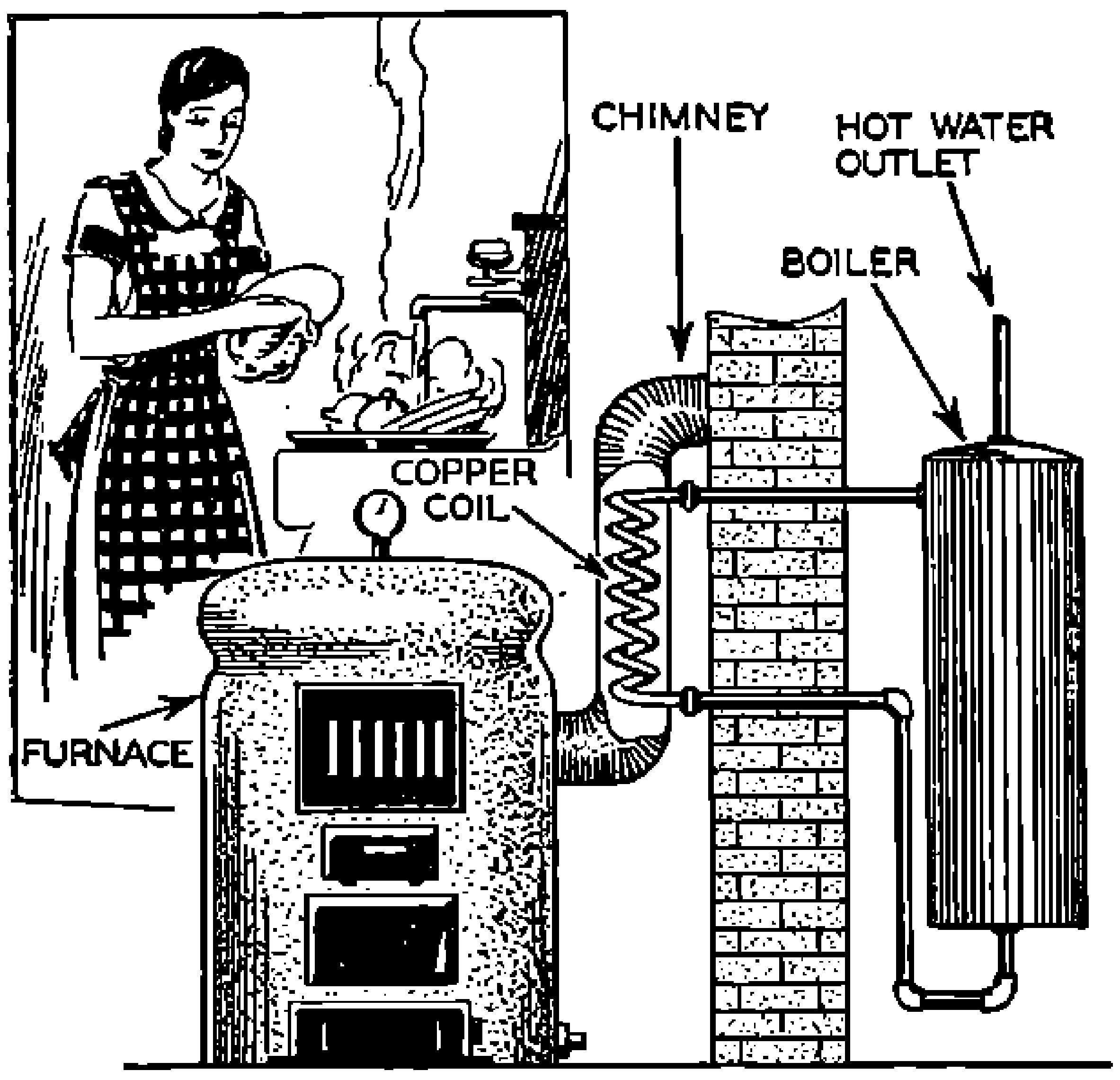


Magnetic Screwdriver for Radio Repair Men



IT'S THE easiest thing in the world to put a screw or a bolt into an inaccessible spot with this handy electro-magnetic screwdriver. It is made simply by winding on about fifty turns of No. 24 cotton covered wire in two layers over the shank as illustrated in the drawing at the left. Then connect the end of one wire through a switch made out of two old contact springs from an old plug-in socket. Two ordinary dry cells will furnish sufficient juice to magnetize the shank and hold the bolts or screws in place.—Jas. McDermott.

Mechanical Aids for the Housewife

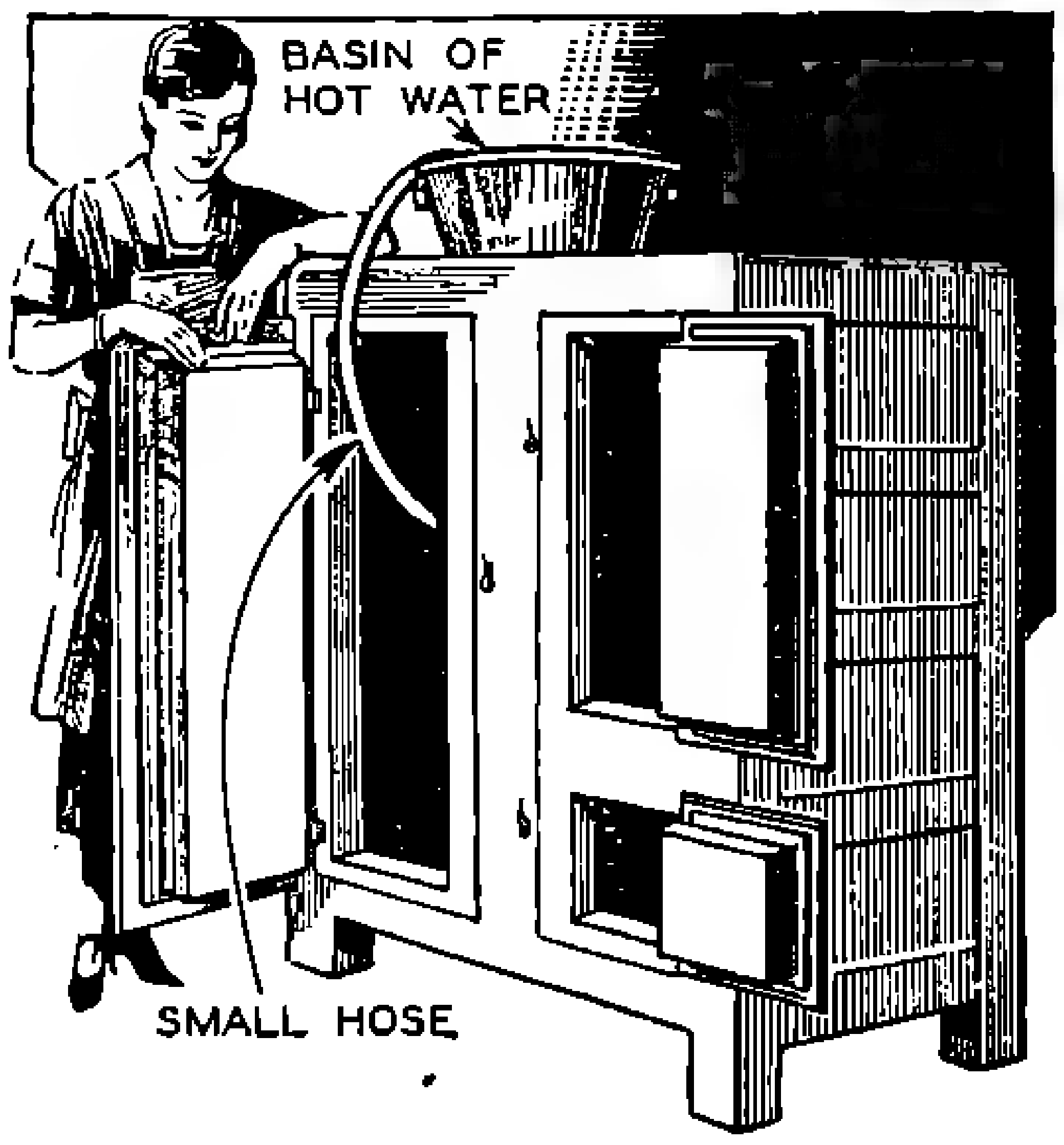


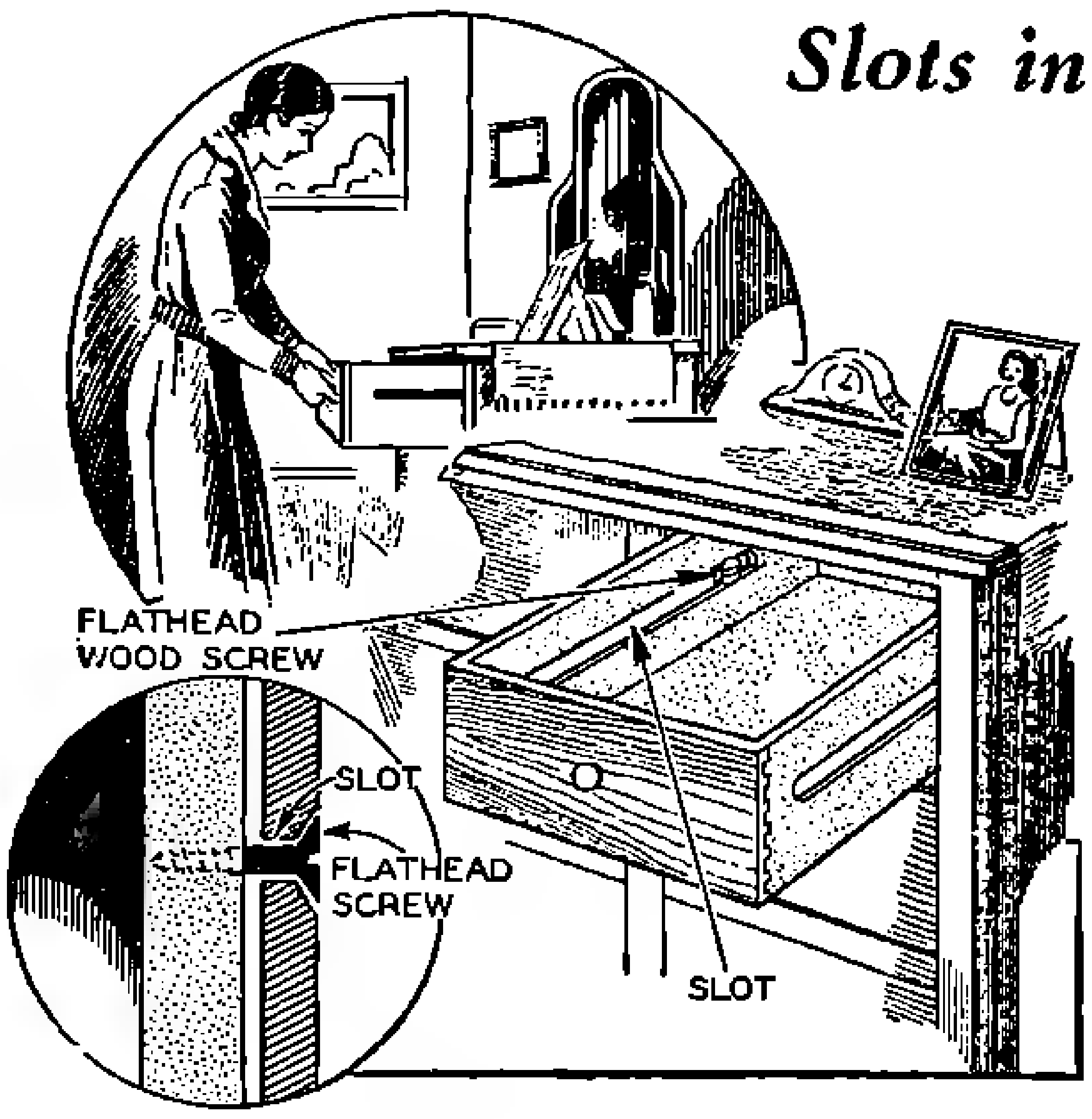
Furnace Pipe Heats Water for the Kitchen

INSTALL this little water heating contraption in your furnace pipe and your hot water worries will be over for a long time. The only materials needed are a copper coil, a length of brass pipe, and a few connections, all of which may be obtained from any dealer in plumbing supplies. The coil is set into the chimney pipe, as illustrated in the drawing at the left. The cold water enters the coil at the bottom, is warmed by the heat coming up through the chimney pipe, and then passes back into the boiler, ready for use. Of course, you must have a support for the boiler, and some good insulation for the pipes, but any good mechanic can figure that out. The hook-up of the pipes is the same as that for ordinary boiler installation.—T. Kornylak.

Scalding Ice Box Without Danger of Burns

THAT repulsive kitchen chore of periodically scalding out a refrigerator is as essential as washing the dishes, lest the interior develop a bad case of "ice box halitosis." How this task can be performed with greatest ease is depicted in the accompanying drawing. First place a panful of boiling water atop the icebox. Then procure a four-foot length of small rubber tubing and anchor one end of it to the bottom of the pan by slipping it through the handle of an inverted teacup. Finally start the siphon working and scald down the walls. With this method it is possible thoroughly to clean every nook and corner. Also, as the hands do not become wet, a much stronger deodorant can be used in the water. A good scrubbrush brought into action will help matters a lot.—David Bacon.



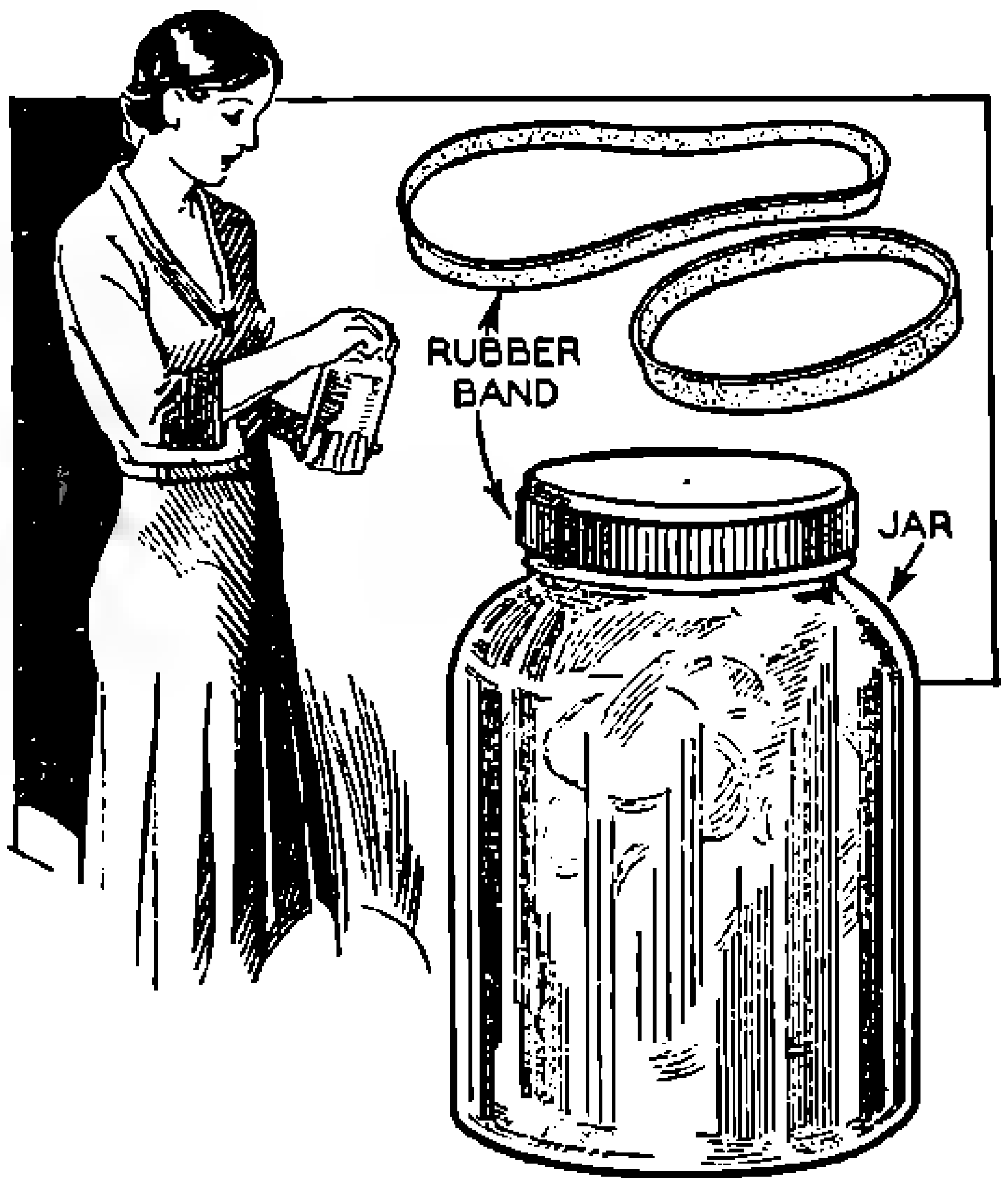


Slots in Drawer Sides Prevent Spilling of Contents

TO MAKE it impossible to pull out a drawer too far, so that there is no danger of a crash to the floor, put this little kink to use. First, cut a long narrow slot in each of the two sides of the drawer, making it about ¼ in. wide, with inner edges beveled. A large flat-head wood screw is then driven through this slot and into the side post or frame, so that it is flush with the inside surface. The same is done for the other slot. If you should ever wish to remove the drawer, you can do so by merely taking out the screws. This stunt is especially recommended for drawers which are heavily loaded with tools or other heavy objects. With it there is no danger of spilling them all over the floor.—Andrew Vena.

Rubber Bands Open Stubborn Fruit Jars Easily

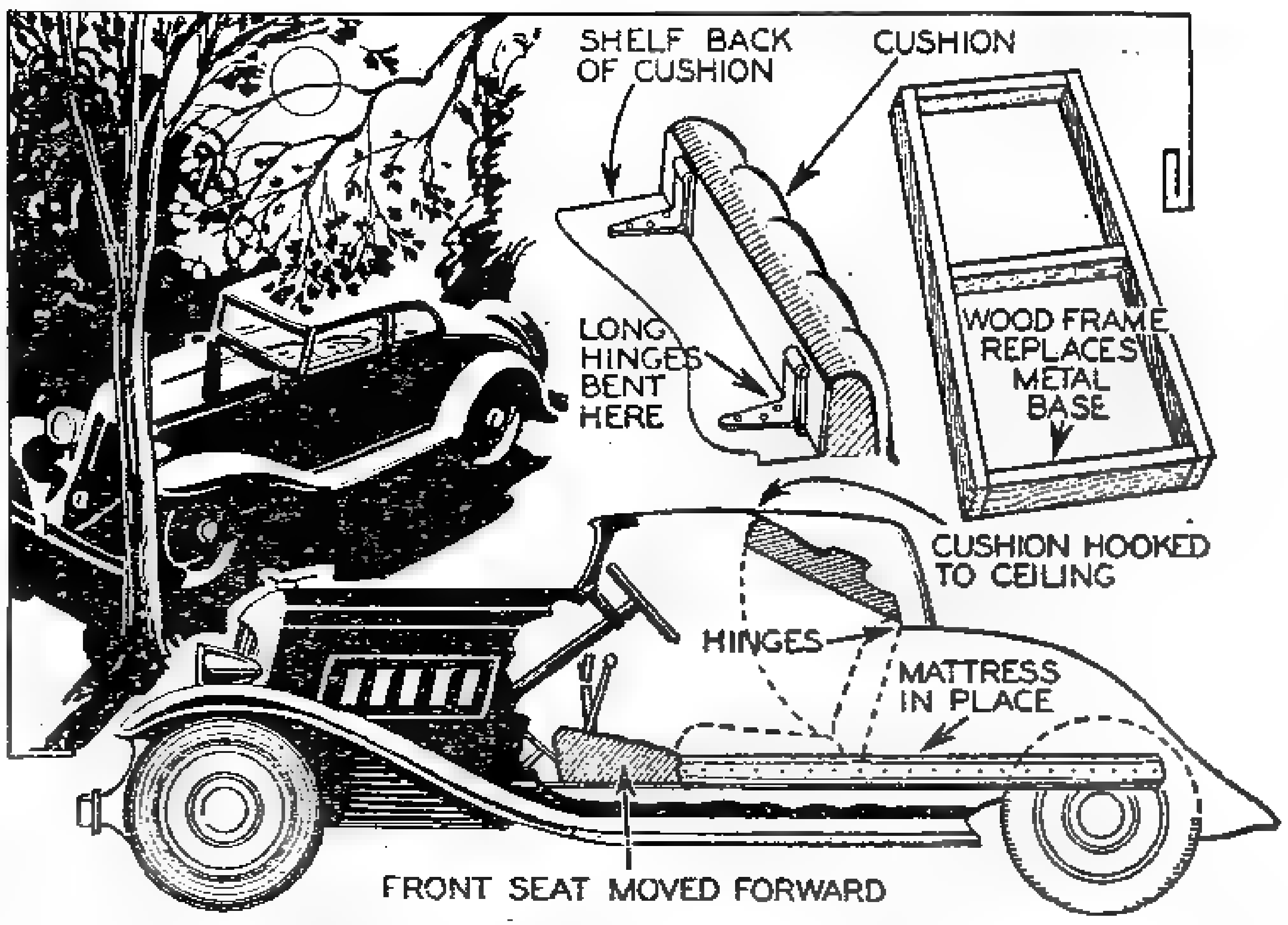
IF, AS a man about the house, you've ever been called upon to unscrew the top of a fruit jar, you know what a hopeless task the job is. Well, here's what to do about it. Simply lay hands on an old rubber band, preferably one cut from an old inner tube, and wind this band around the lid, as illustrated in the accompanying drawing. First, however, bang the top lightly on some hard surface. Then grab hold and twist with all your might. The rubber keeps the fingers from slipping, and affords a better grip. It might be advisable to have a number of bands of various sizes for various sized jars. It's advisable to have the band fit rather tightly on the metal.—Florence Carlson.

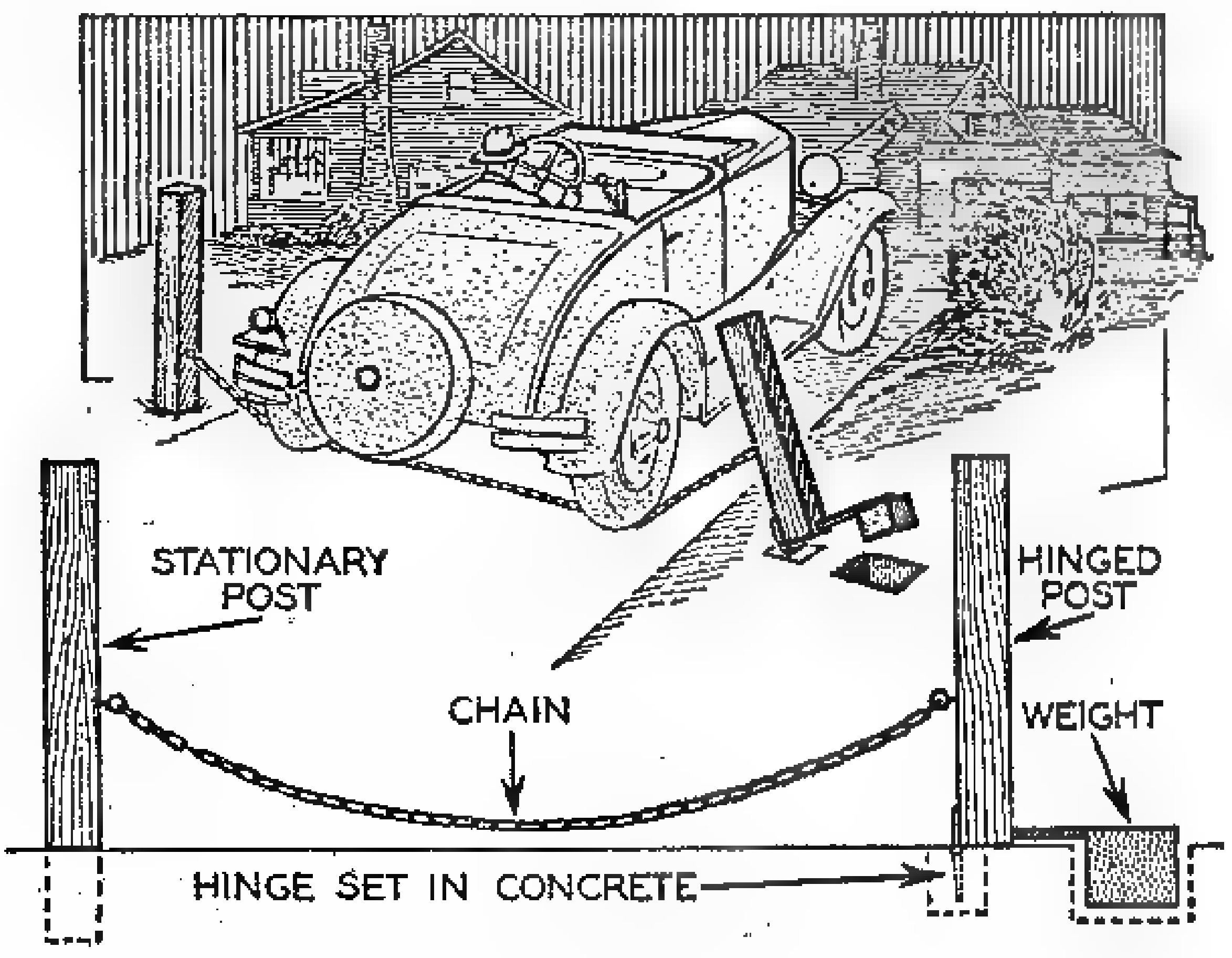


A Page of Items for Motorists

Converting Coupe Into Bedroom

ANY automobile coupe may be quickly converted into a perambulating bedroom. Screws which hold the back cushion in place are removed and the top hinged to the back shelf. The metal base on which the seat rests is removed and in its place is substituted a wooden frame, which is made removable through the aid of dowel pins. By hooking the cushion to the crossbow in the ceiling, and removing the seat, plenty of room is left for a bed. The front seat is moved forward to serve as a pillow, while the mattress is spread out over the rest of the bed.—Everett Folger.


SHELF BACK OF CUSHION
CUSHION
LONG HINGES BENT HERE
WOOD FRAME REPLACES METAL BASE
CUSHION HOOKED TO CEILING
HINGES
MATTRESS IN PLACE
FRONT SEAT MOVED FORWARD

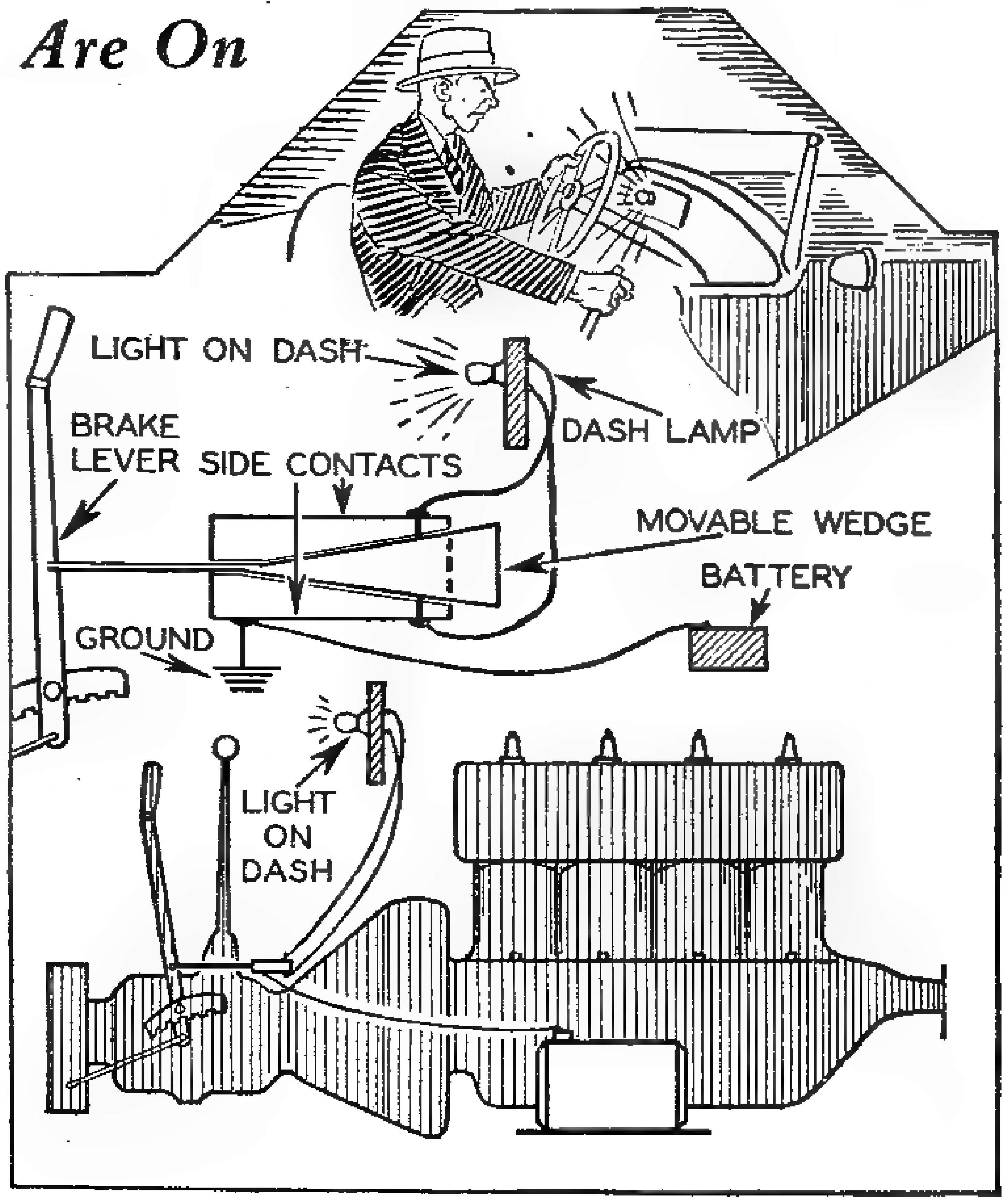

STATIONARY POST
HINGED POST
CHAIN
WEIGHT
HINGE SET IN CONCRETE

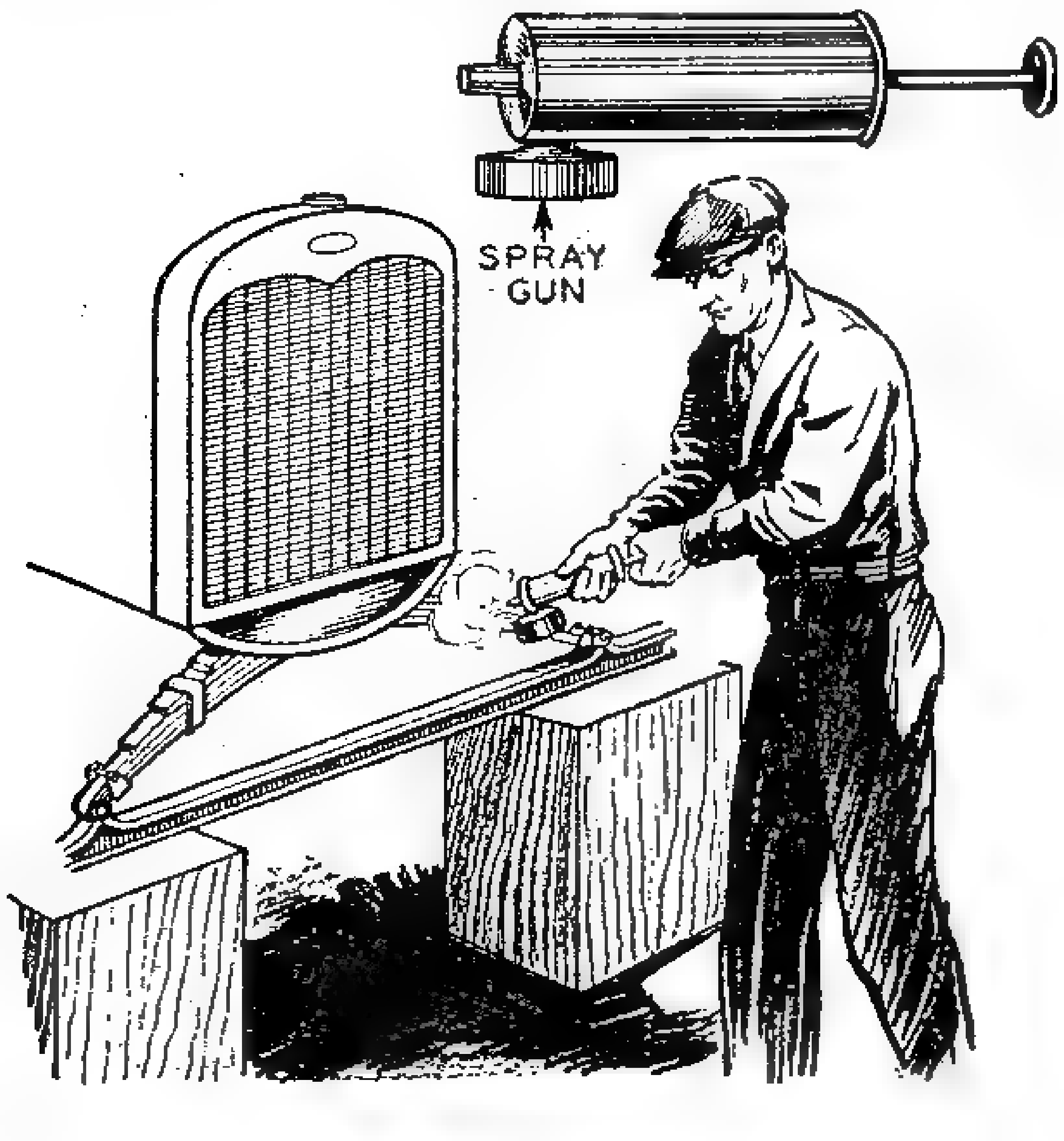
Gate Lowers When You Drive Over It

PRIVATE road signs are unnecessary when you have this chain strung across the driveway. As illustrated in the accompanying drawing, one end of the chain is hooked to a stationary post, while the other end is hooked to a hinged post, having a weighted outrigger. When you drive over the chain, which should be low enough so that it doesn't catch on any parts of the car, the hinged post tips over and lets you pass. When you're over, the post rights itself and raises the chain, which tells the public that the road is closed.—N. G. Near.

Dash Light Tells When Your Brakes Are On

HAVE you ever tried to get under way in your auto and found that you couldn't budge? Then suddenly looked down and saw that your emergency brake was on? That nuisance can be prevented by installing this little brake warning. As illustrated in the drawing, it consists simply of two blocks and a wedge, installed near the brake lever and hooked to it. Contact is made when the wedge is pulled in, that is, when the lever is pulled back. This action turns on the light on the dashboard, thus keeping you informed when your brakes are on. Wire the gadget up as illustrated in the drawing at the right. With this little gadget installed there is no danger you will ever damage your clutches. —Wilkey Zane.

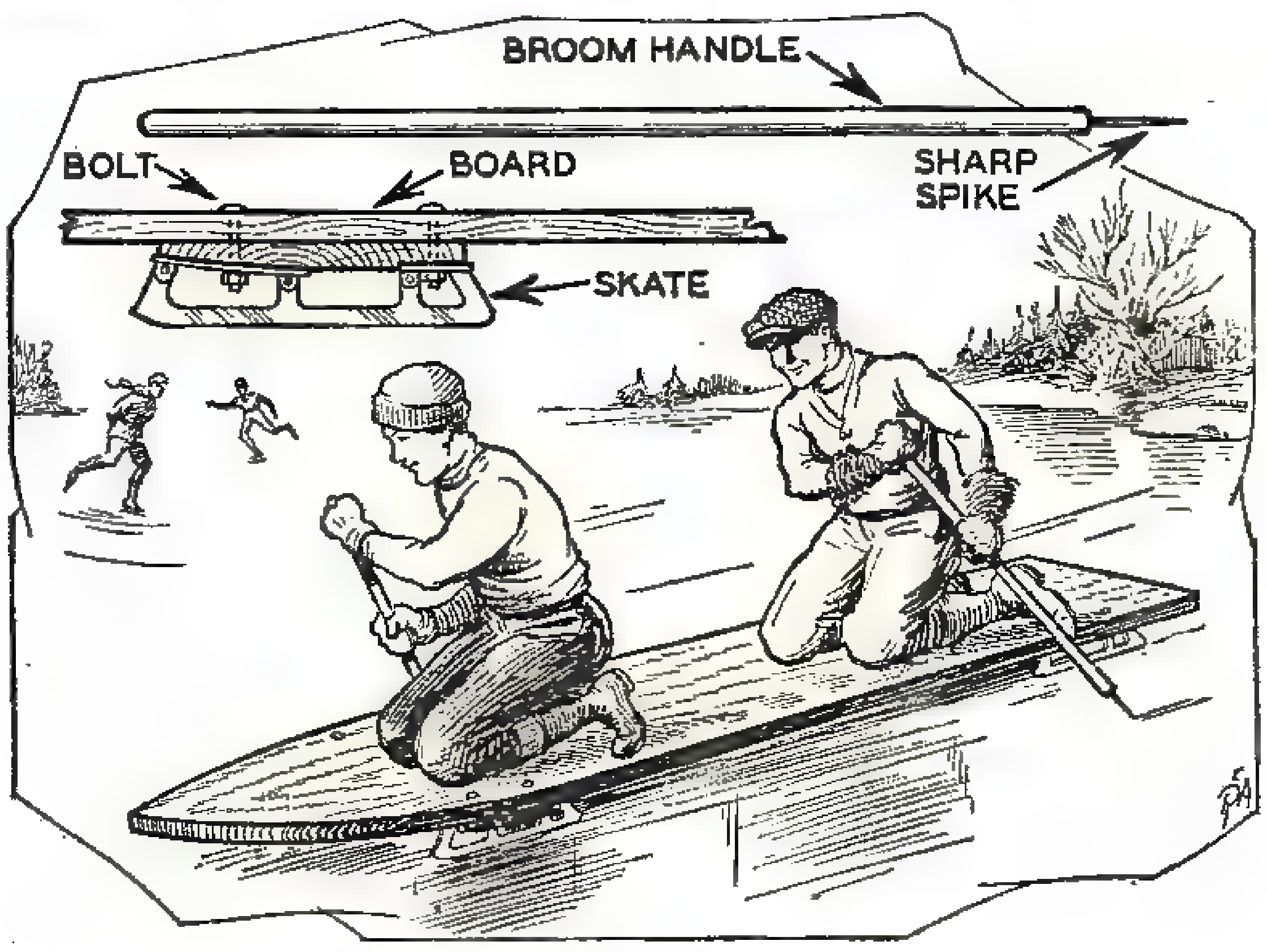

LIGHT ON DASH
DASH LAMP
BRAKE LEVER
SIDE CONTACTS
MOVABLE WEDGE
BATTERY
GROUND
LIGHT ON DASH



Kill That Spring Squeak With an Oil Spray

SQUEAKY springs play hob with your nerves when you're cruising along a bumpy road, but the way to remedy the difficulty, needless to say, is to oil the springs. The best way to do this is to get yourself a little spray gun and fill it full of light oil. Then proceed to spray the springs thoroughly in the manner demonstrated by the gentleman in the accompanying drawing. A few saturations like this and you'll have a silent riding car.—Dale Dawson.

New Fun Stunts for Youngsters

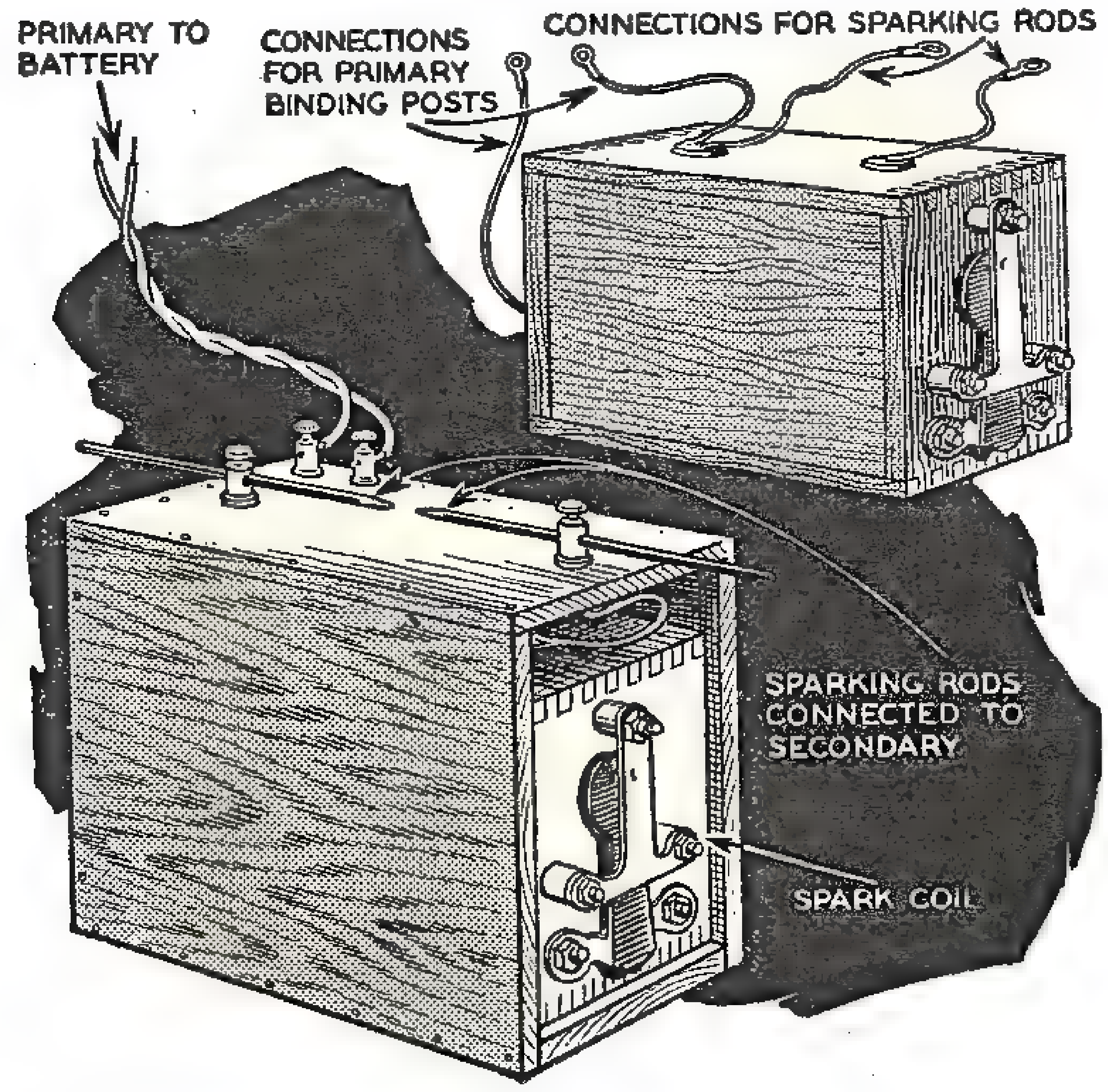


Induction Coil for Experimenters

AN OLD Ford spark coil will make a very satisfactory induction coil for experimental purposes. Nail together a wooden box to house the spark coil snugly as shown in the diagram below.

Next, solder insulated wires, as illustrated, to the spark coil to provide connections to be fastened inside the box to the binding posts. Use radio binding posts for the primary connections. Select two large brass binding posts to hold the sparking rods. The sparking rods also should be brass. Suitable material can be purchased at a well stocked hardware store for a few cents. Use a rod having a diameter of approximately one eighth of an inch. Redrill the holes in the two binding posts if the holes are not large enough to accommodate the rods.

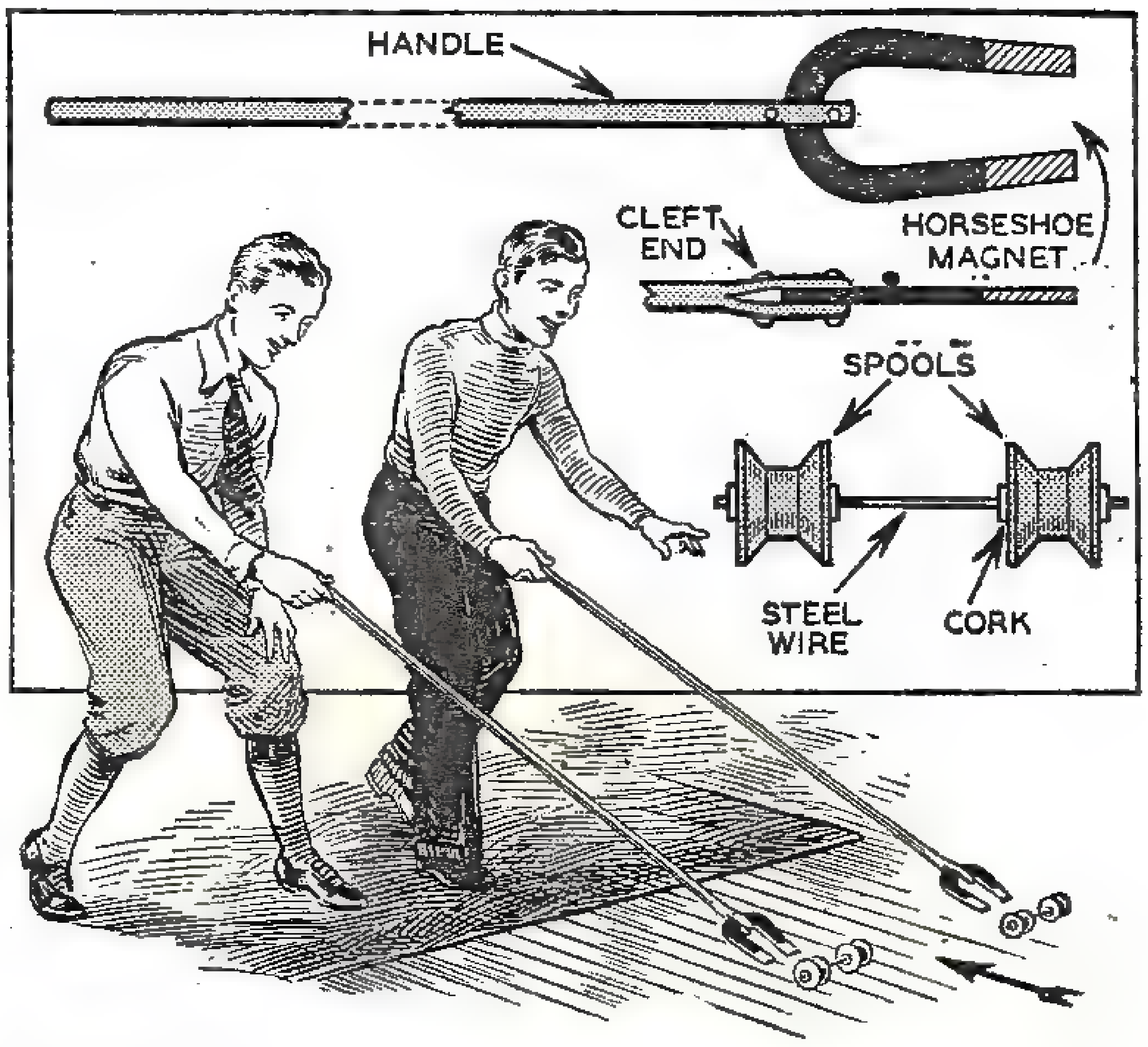
Two dry cells connected in series with the primary connections on the box will operate the coil very satisfactorily, or it may be operated from a toy train transformer.—George Smith.


PRIMARY TO BATTERY
CONNECTIONS FOR PRIMARY BINDING POSTS
CONNECTIONS FOR SPARKING RODS
SPARKING RODS CONNECTED TO SECONDARY
SPARK COIL

Ice Canoeing Is New Winter Sport

A FLEET of these ice canoes racing down a clear stretch will bring more cheers from a crowd of spectators than a football game. The bodies of the canoes are strong boards eighteen inches wide, with two pairs of skates bolted to the bottom as illustrated in the accompanying drawing. The pike poles are made from suitably long broom handles, in which are driven long spikes. These spikes are dug into the ice to push the canoe along at a rapid pace. Two strong lads can propel one of these craft along at a good pace.—L. B. Robbins.

Play the 100-yard Magnet Dash



HERE is a chance to try your skill at a new and novel game. It can be plenty of fun due to the trickiness of the magnet and the unpracticed skill of the players.

The roller is made by taking two wide flanged spools and driving a plug of cork or wood through the center of each. Then drill the plugs with a small hole in their exact centers. The spools are finally connected by a shaft of *steel* wire about 6 inches long.

Now take a large horseshoe magnet and clamp it to a long wooden handle as shown. Saw a slot up the center of one end of the stick, insert the shoulder of the magnet and then clamp it tight by two small bolts. A pair of magnets and spools should be thus prepared for a contest.

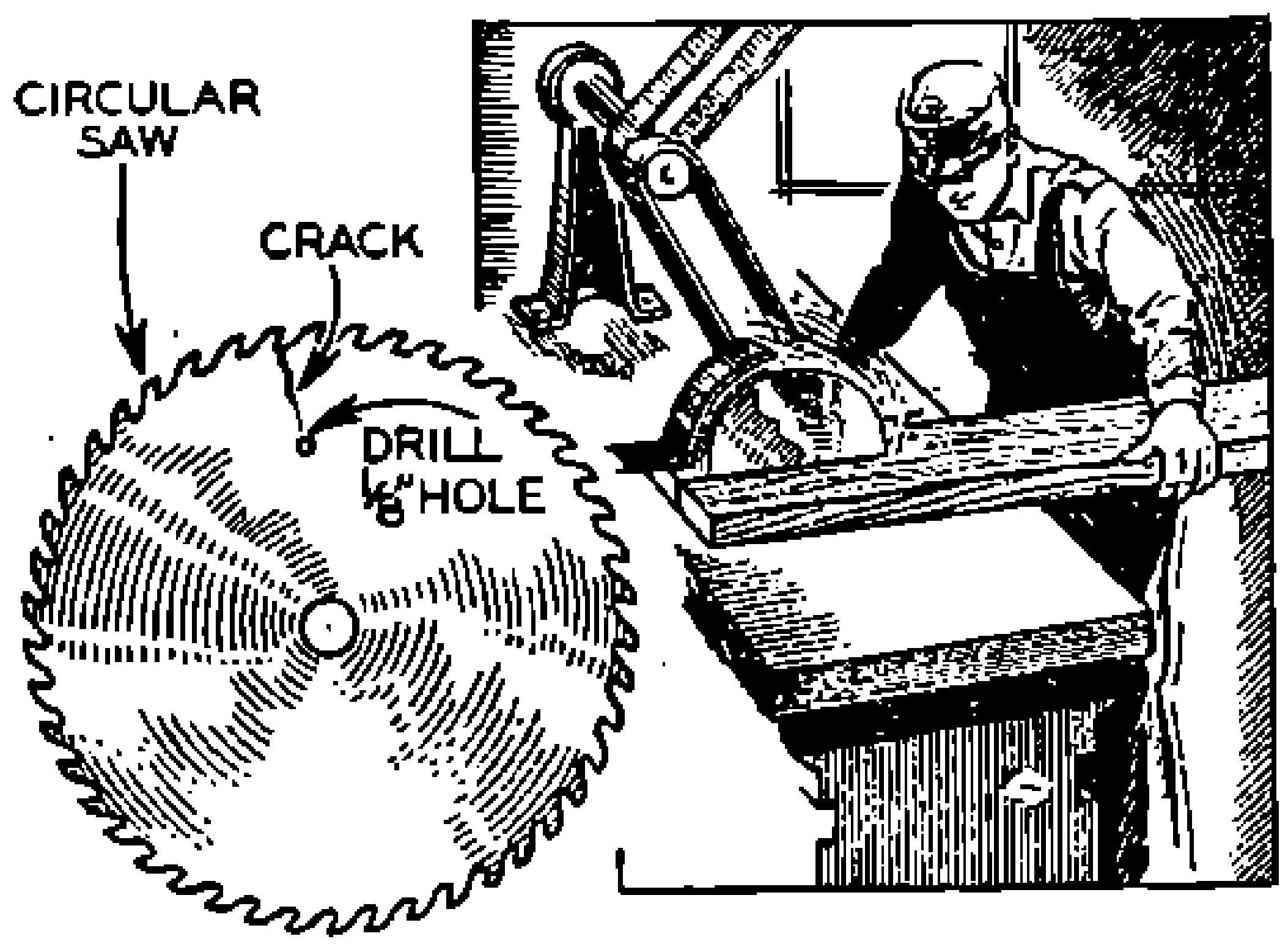
Measure off a distance 100 inches long on a level table or smooth floor and place the rollers at the starting line. Then each player brings his magnet close to the steel shaft until his spool moves towards it. The one who draws his roller to the finish line without the shaft sticking to the magnet wins the race.

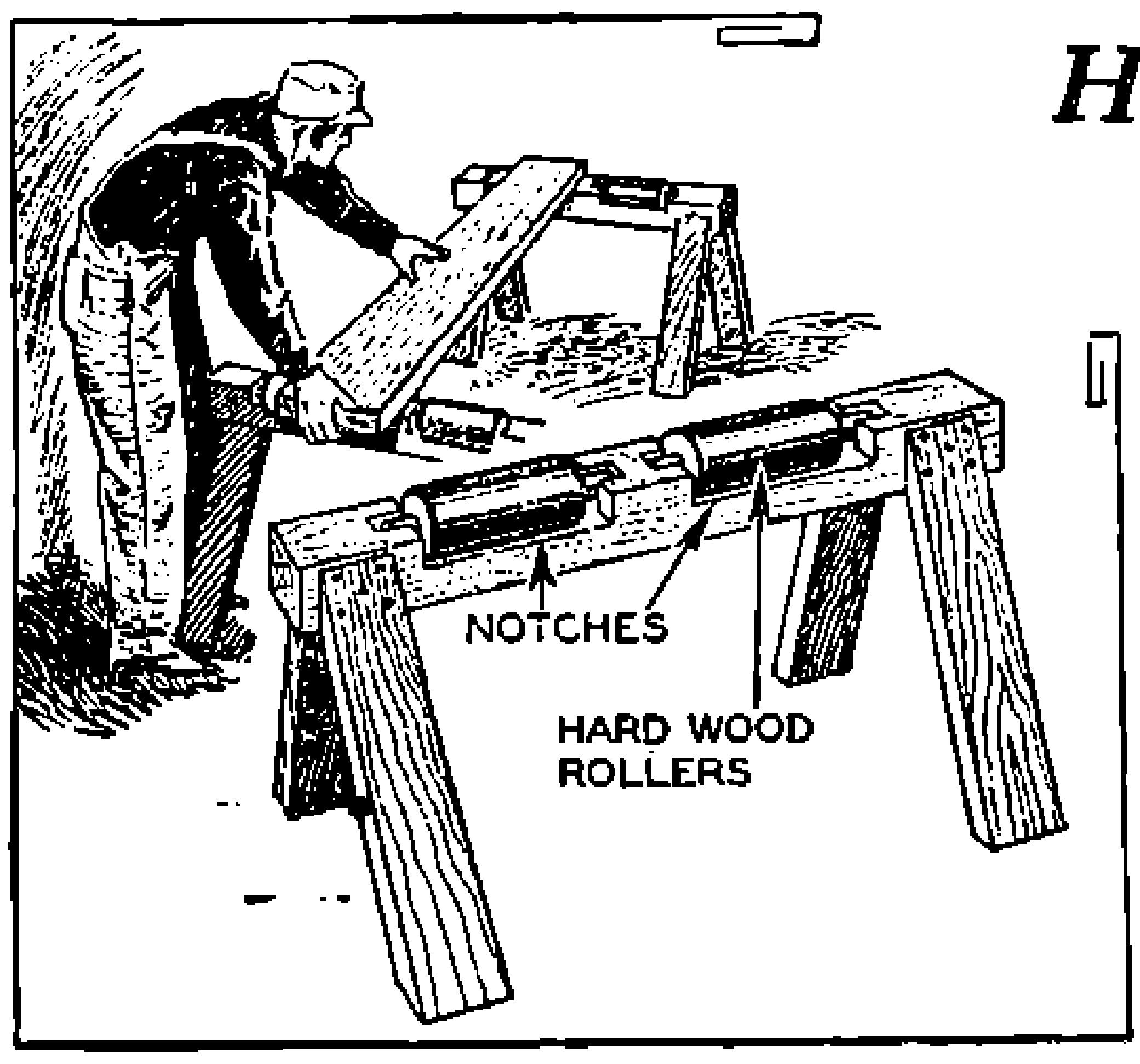
A little practice will teach you the trick of keeping the magnet just a jump ahead of the spools.—Thornton Hallett.

Labor Savers for the Workshop

Simple Stunt to Save a Cracked Saw Blade

OFTEN after a circular saw has been used considerably, a small crack will start near the outer edge. If not arrested at once, the crack will travel to the hub and the blade will be ruined. However, if discovered before it has progressed too far, it can be effectively stopped by drilling a ⅛-in hole a fraction beyond the end as shown in the illustration at the right. Although it may seem that there is a possibility of accident resulting from this practice, it is recommended by well known saw manufacturers.—Robert L. Dumas.



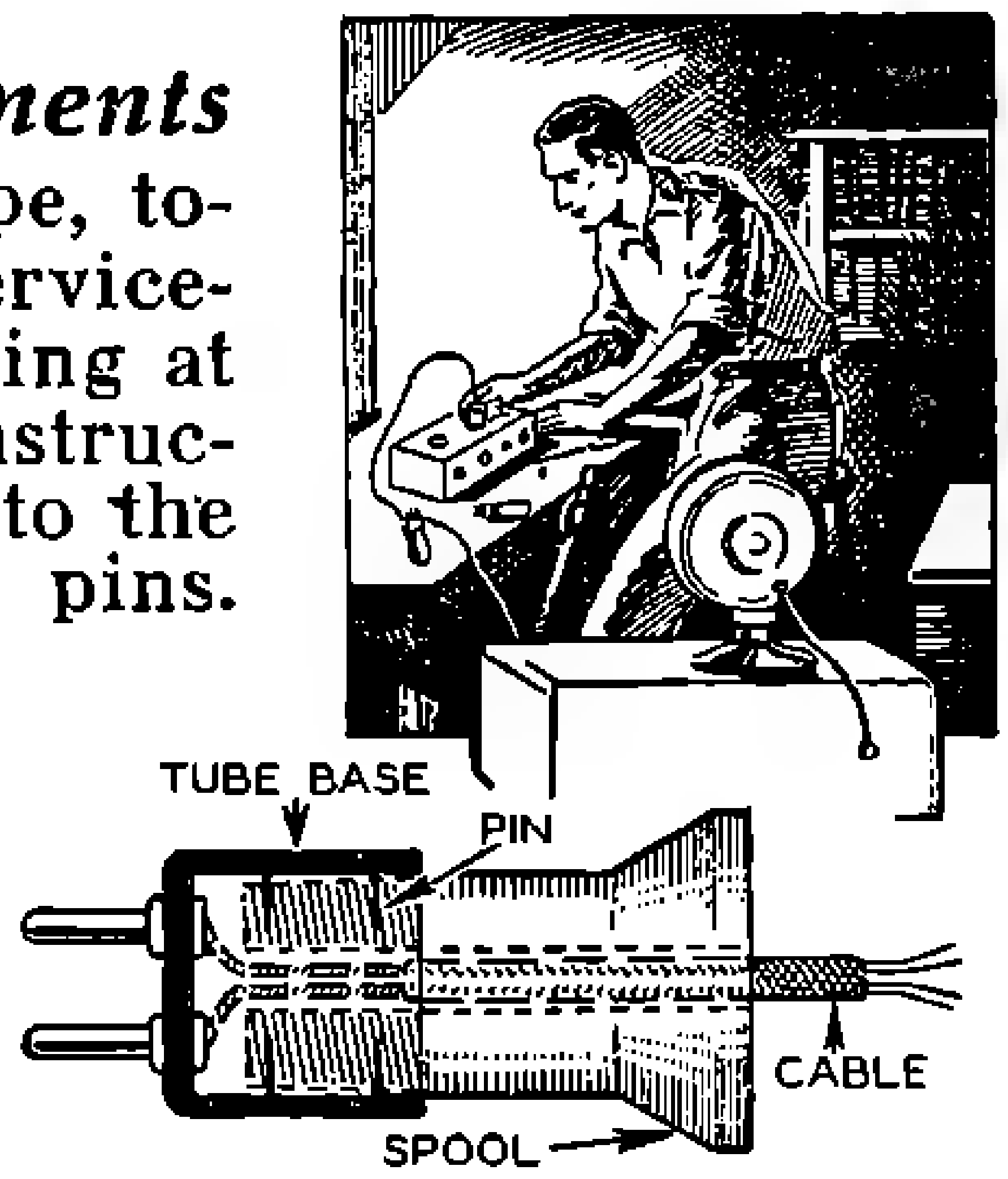


Heavy Timbers Shifted Easily on This Sawhorse

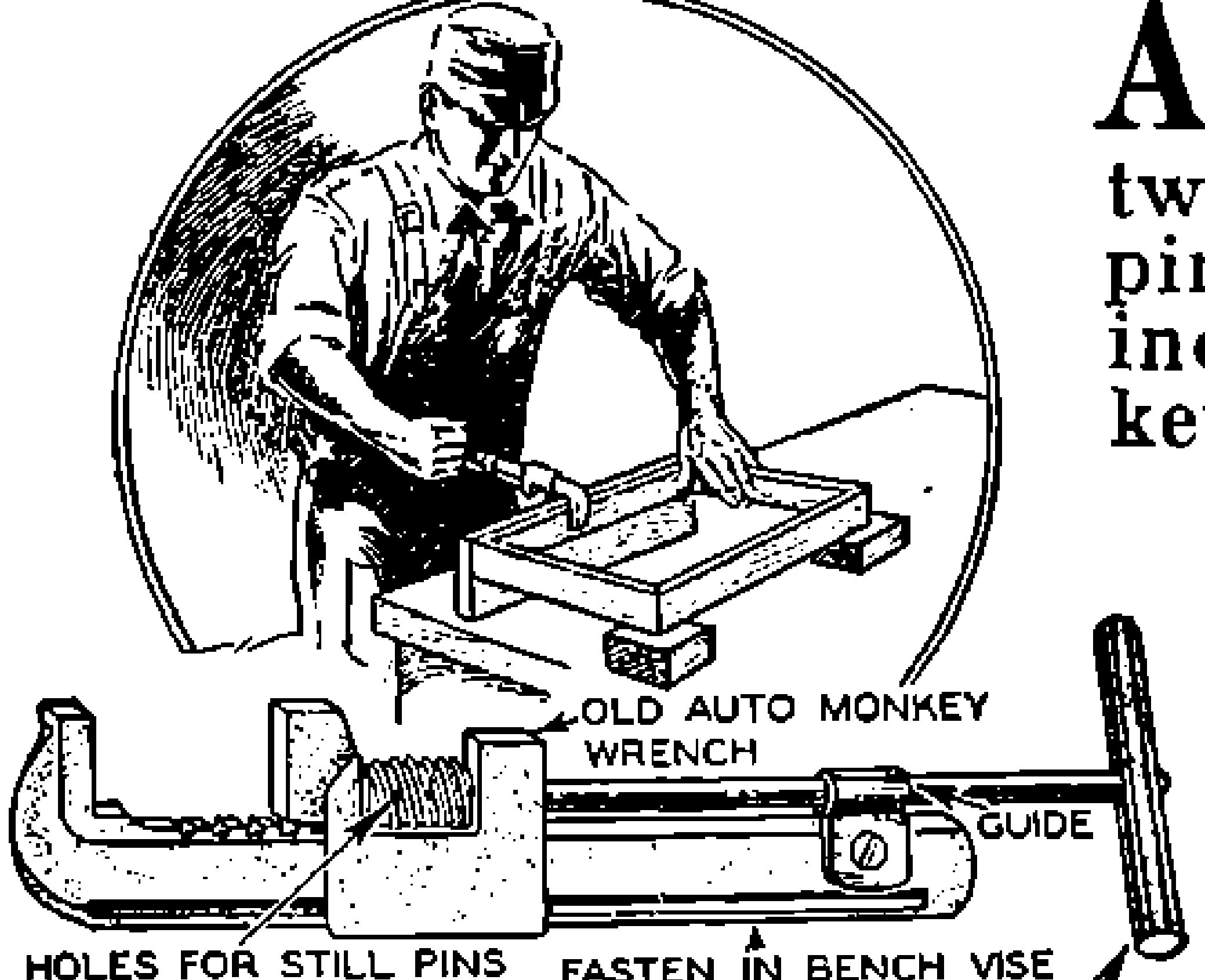
IN WORKING with timbers, especially the larger size, much trouble is experienced in moving the work one way or the other. To overcome this trouble build yourself the sawhorse shown in the accompanying drawing. In the top of the sawhorse two notches some two inches deep are sawed, and in these notches a small groove is cut in each end. Hardwood rollers are then set in the notches so that they come about a quarter of an inch above the top of the sawhorse. When working with heavy timbers and it is necessary to move them endwise, the rollers do their duty with perfect ease.—George Daulberg.

Old Tube Base Makes Plug for Electrical Experiments

AN OLD radio tube base of the four, five and six-prong type, together with an empty thread spool, will make a highly serviceable plug for electrical experimenters. Referring to the drawing at the right, it will be noticed that the plug is of very simple construction. The spool, which is sawed in half, is trimmed to fit into the tube base tightly, and held firmly in place with small steel pins. These pins are made of small nails. Before the spool is put into the base, each wire's bared end may be pushed into the prongs and soldered in. The cable to the instruments is led out through the hole in the spool as illustrated.—Howard Chandler.



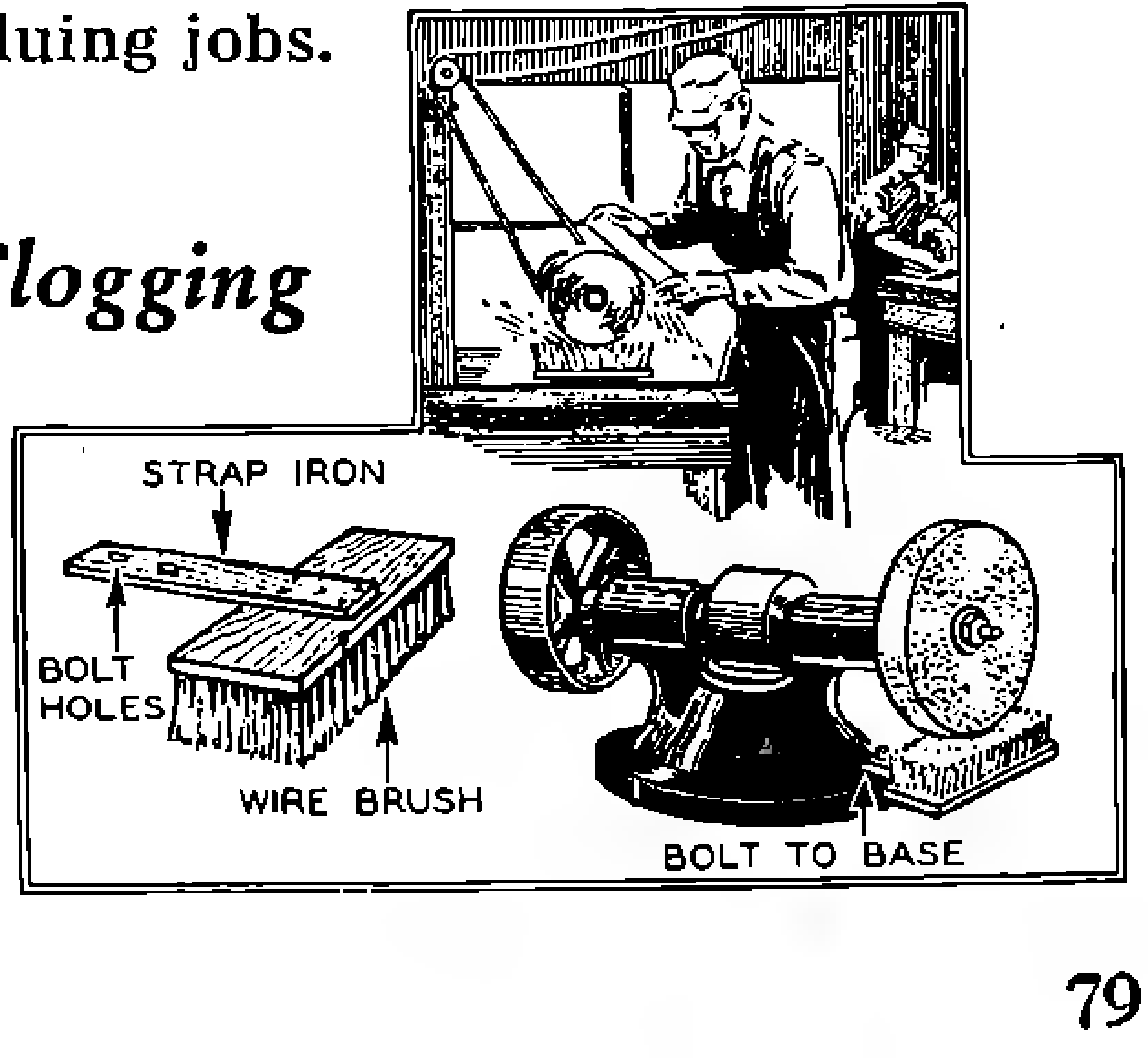
Serviceable Gluing Clamps From Two Wrenches



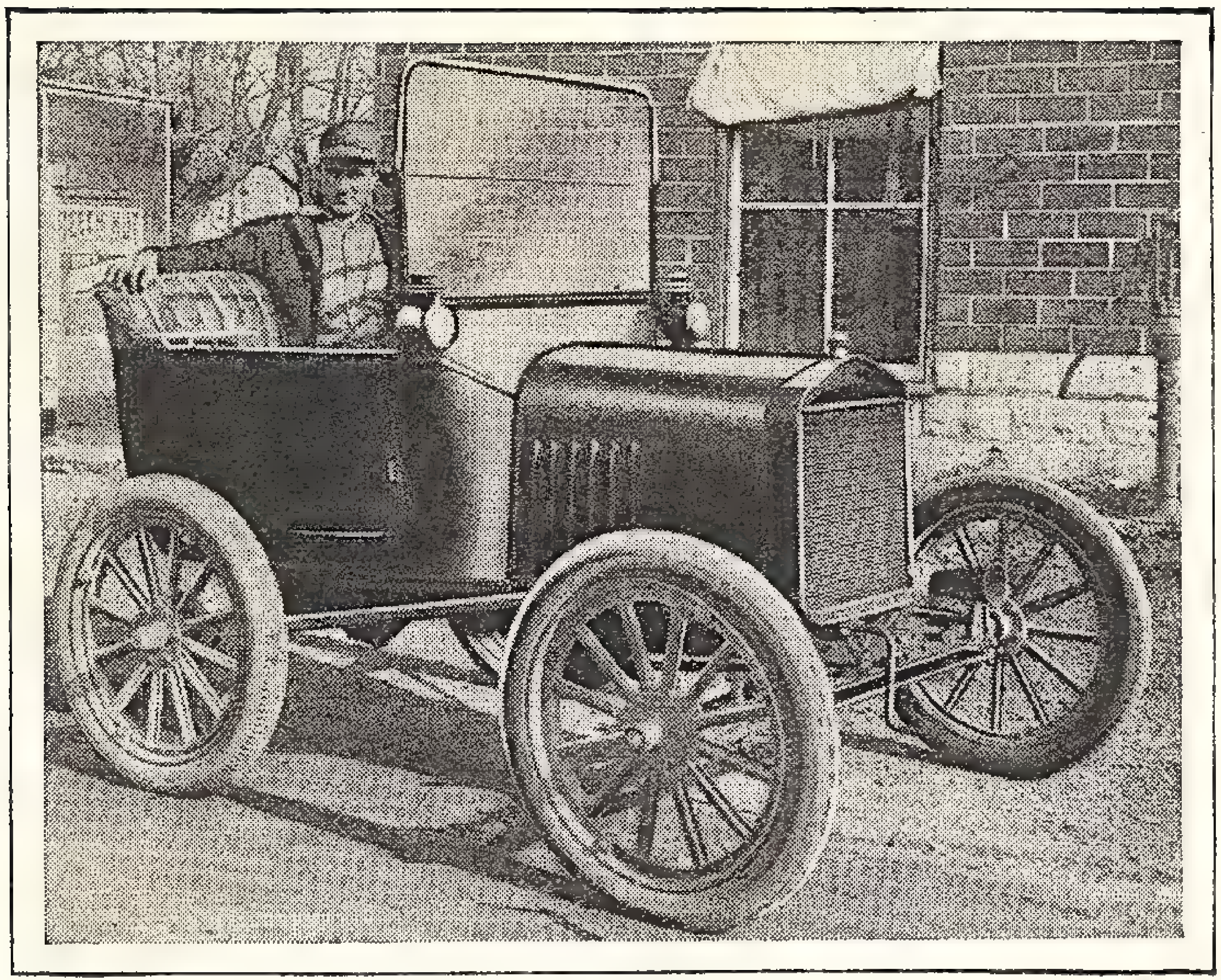
A STURDY pair of clamps for a multitude of shop jobs can be made from two old monkey wrenches, obtainable for two bits or less at any hardware store. The thumbscrew pin is removed and remounted on a length of steel rod as indicated. If you have the tool equipment for cutting a keyway, it is advisable to key the rod to the thumbscrew. Any sort of handle will do for the end rod, providing it is keyed or pinned to the rod. The supporting guide for the rod may be fashioned from any kind of sheet steel, and is fastened to the handle of the wrench with a stove bolt. The contrivance will prove ideal for wood gluing jobs. —John E. Hogg.

Wire Brush on Emery Wheel Prevents Clogging

GRINDING soft metals such as lead, babbitt, aluminum, etc., often results in a clogging of the pores of the emery wheel. These pores can be cleaned out easily, however, if you will equip your machine with a stiff wire brush as illustrated in the drawing at the right. The brush should be fastened to a piece of strap iron, which is fastened to one of the base bolts of the grinder head as shown.—Daniel Stone.

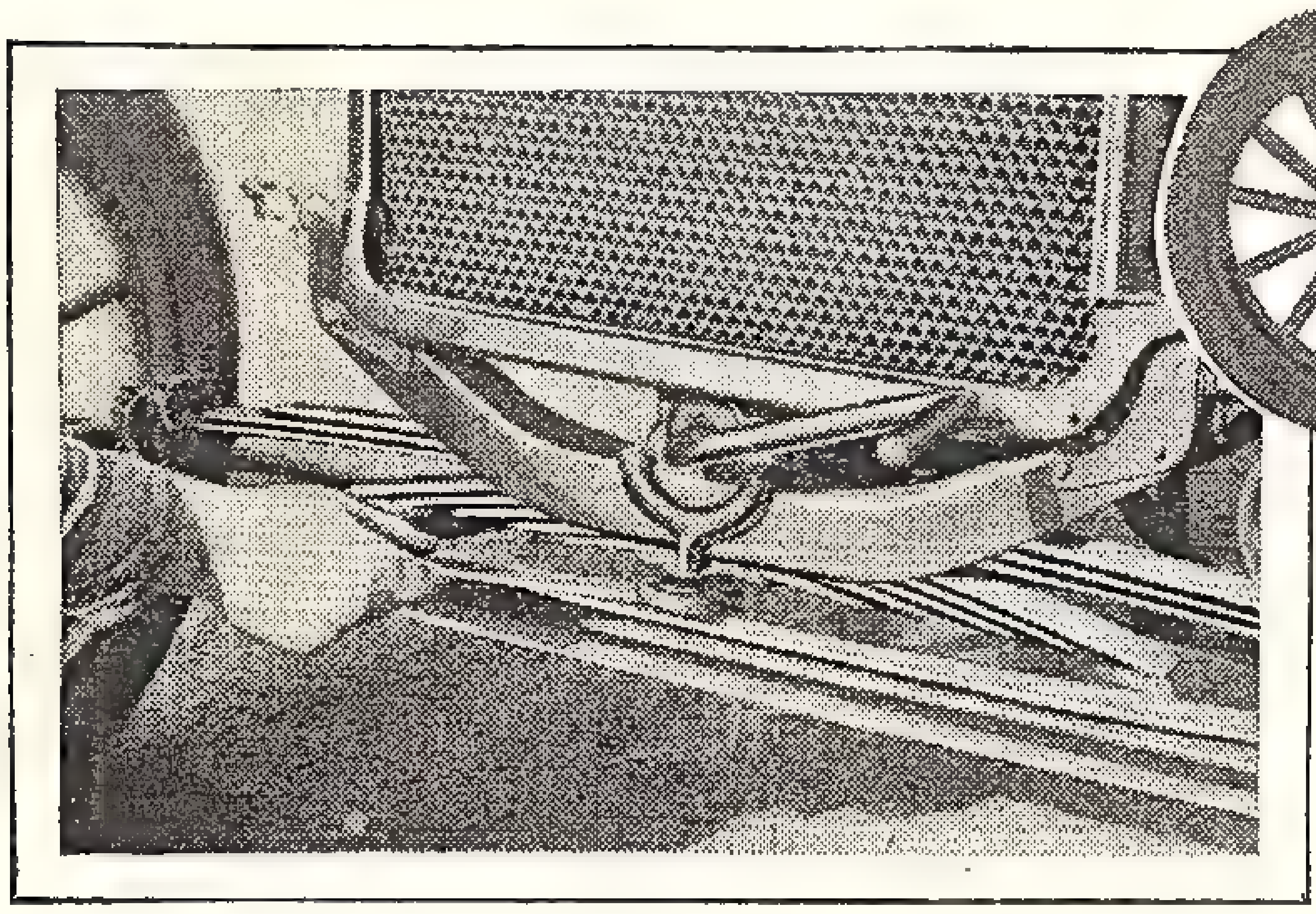


BUILD a COMEDY

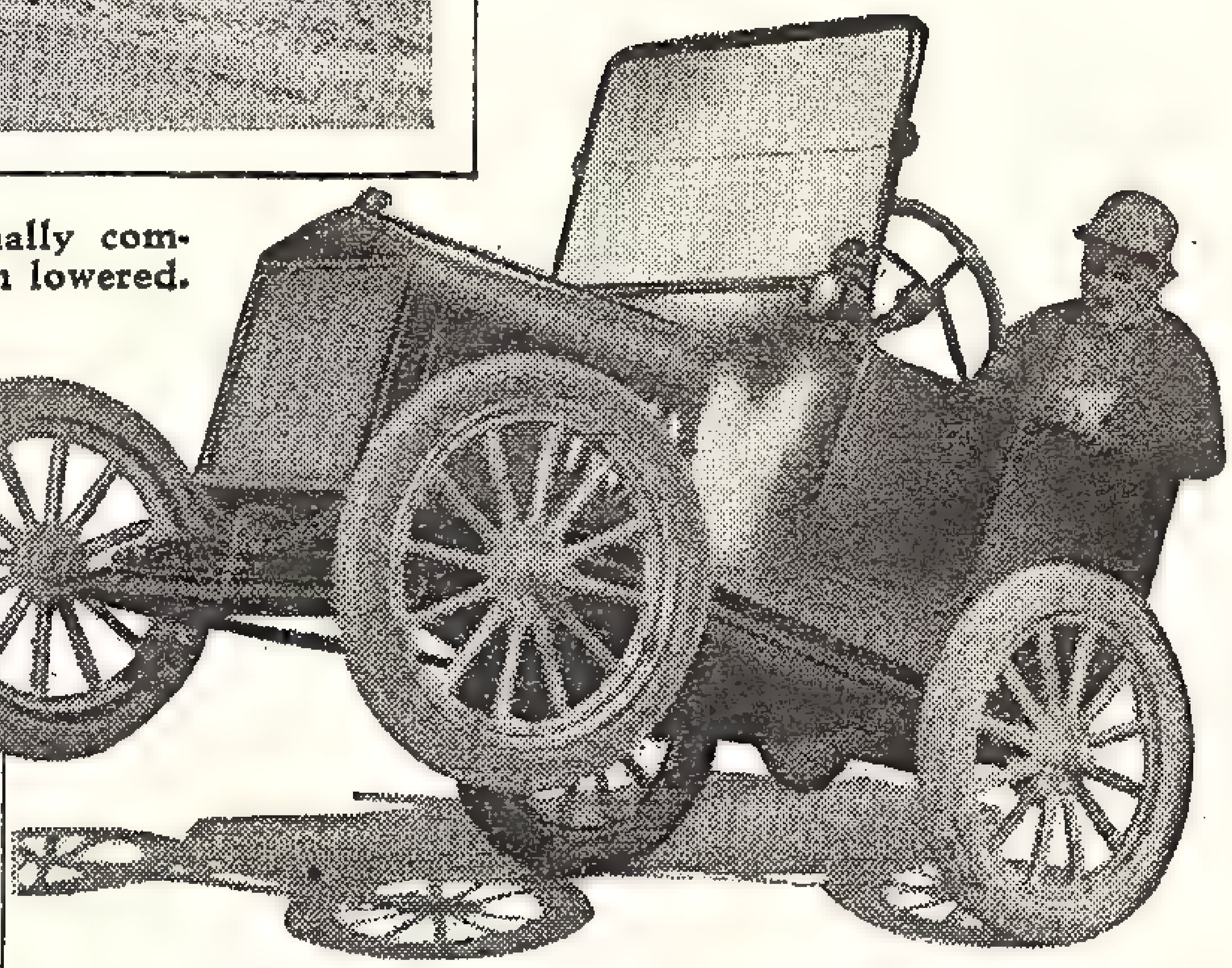


Good money can be made at carnivals and in advertising stunts for local merchants with a sawed off bug made from Model T Ford parts. This article describes the changes that are necessary for making the entire conversion, ready for use.

Here's the way the ½ Ford touring car looks when finally completed. The fenders are missing and the whole job has been lowered.



The top five leaves of the front spring are removed, and inverted. They are placed on the bottom of the spring pile. This lowers the car forward (leveling with rear axle) furnishing a stout shock absorber so that—



—when the car is suddenly started and the front end rears up the lowered and inverted forward spring leaves act as a strong absorber for drinking up the dropping shocks.

AN ATTRACTION that is sure fire always makes a good advertising medium. This converted Model T Ford, or Comedy Ford, can be very easily built, and is a profit maker for any man who has a little ingenuity in selling its uses.

It can be used to carry labels, or to give thrilling joy rides about town, or to provide a freak set of thrills on any country fair race track.

By this conversion the center of gravity of the car is brought so near the rear axle that with two men in the little buggy it can be made to run for quite long stretches on the two rear wheels. Sudden starting makes the front end rear up and act jack-rabbity.

The size and odd appearance of the car make it the center of attraction, and really difficult problems in parking are so amazingly easy that much comedy is given to all onlookers. Like Charlie Chaplin, the car is funny just to look at.

The elements from which this car is made are simple.

You'll need one usable Model T Ford touring in running condition. Remove the body and cut it in two with tin snips right behind the front seat.

That is step number one.

Next, remove the rear wheel assembly, axle and all, and discard the spring and shackles. Then move the axle forward, and weld in a short piece of drive shaft in place of the long one just discarded, seeing that the end of the universal housing and the bearing on the axle are as close together as it is possible to get them.

FORD

Pillow blocks of 2" by 4" stock are placed between the frame and the axle on both sides of the frame, and long U bolts of ½" cold rolled steel are bent and threaded and a clip plate fashioned so that the axle may be bolted to the frame.

Then the frame is hack sawn off right "abaft" the hold down bolt holes for the body.

The radius rods are separated and the ends welded to the sides of the frames.

That completes the rear end.

The front end is very simple, needing but few changes. The main idea is to get the whole frame lowered so that it is more on line with the springless rear wheels. Since the rear wheels are now carrying more of the load than the front, the spring forward can be much less strong and still be plenty heavy. The first five top leaves are removed and inverted, and then placed in the bottom of the spring pile. Thus when the car smacks down to earth after one of its spectacular "rarin's," this inverted spring cushions the shock.

The exhaust is led out through an extension of flexible metal hose.

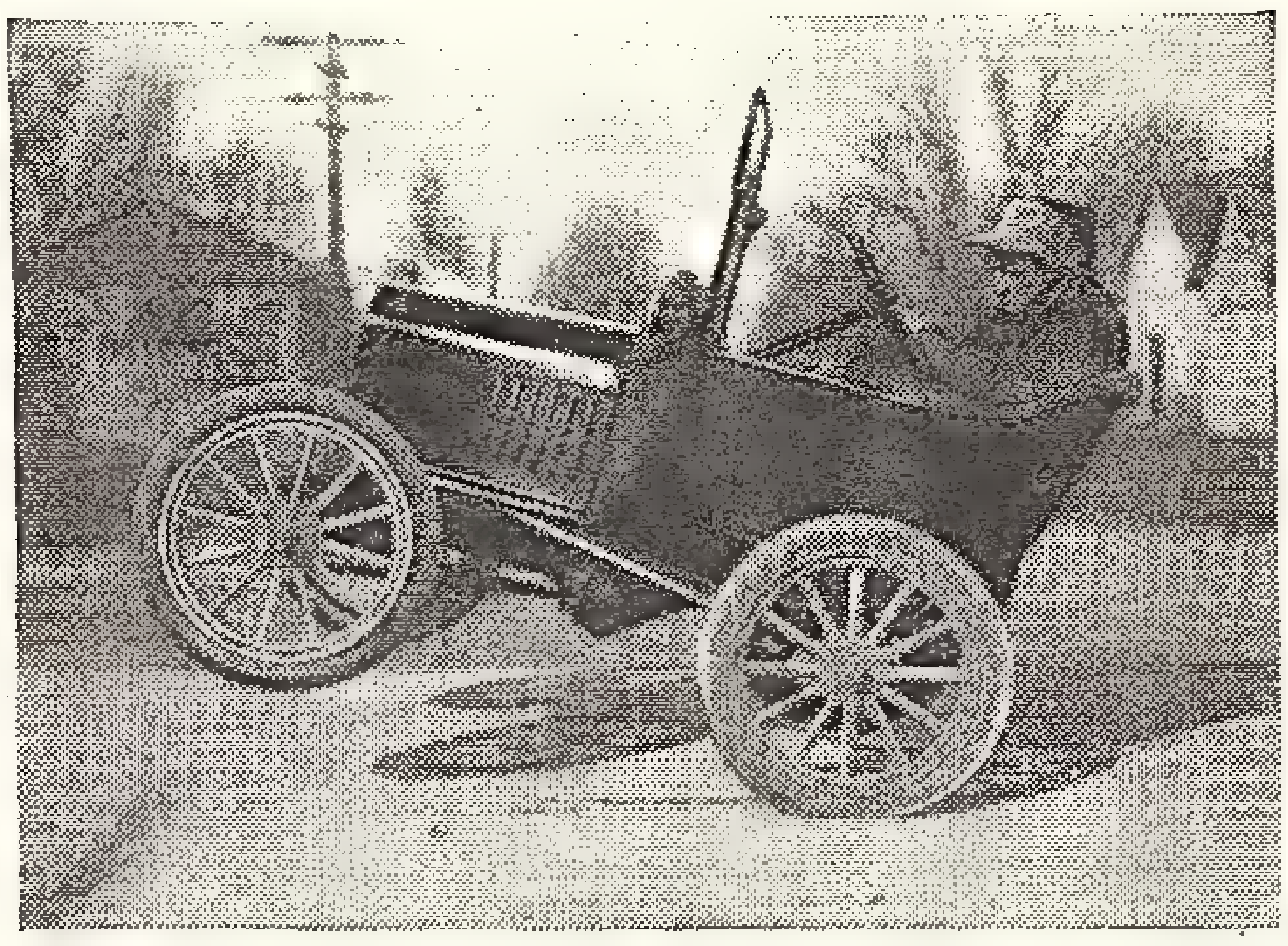
The body is put on, and bolted down.

The matter of marketing the services of the car is not difficult.

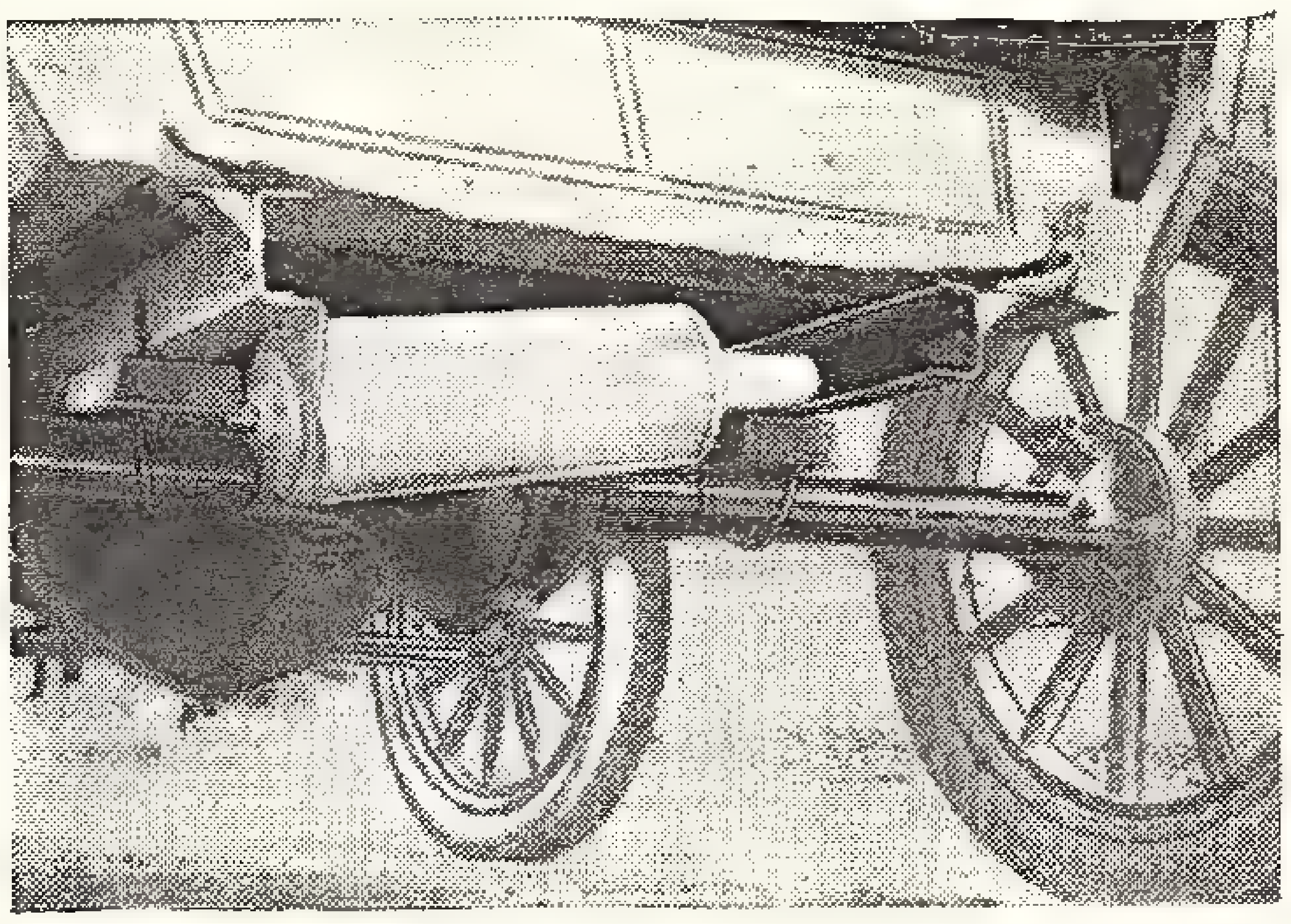
A call to local merchants will soon show you what they are willing to pay for a sign of a comic nature on your car, and by changing the car's literary cargo each week, you will keep the turnover steady.

A matter of giving "jitney" rides is a simple affair in most cities. Put a sign on the car, 5c a ride, and show it doing some of its bucking tricks. Several dollars a day can be earned in an active, well populated community.

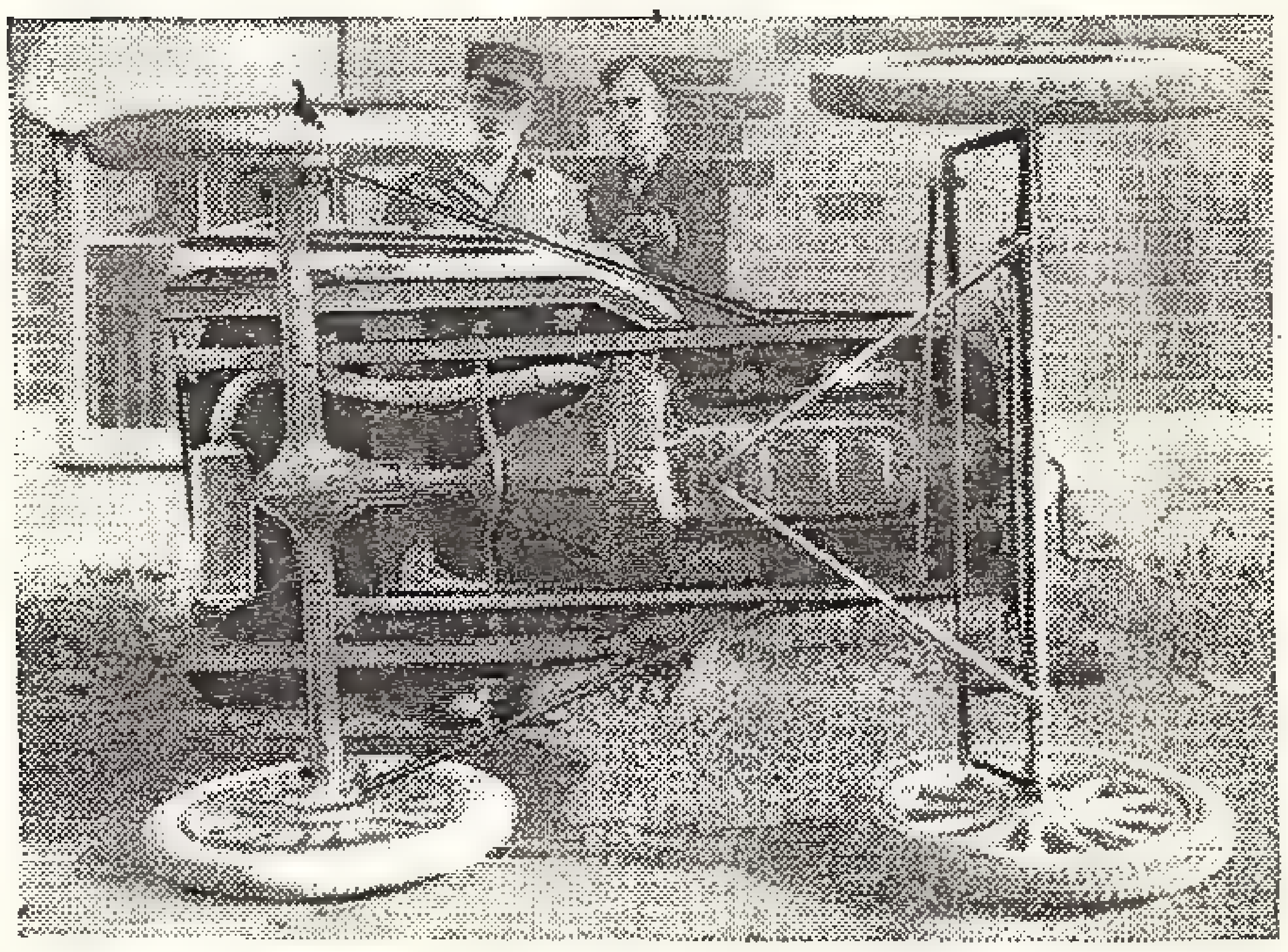
County fair concessions can be ascertained by writing the state bureau at your state capital, through the secretary of state.



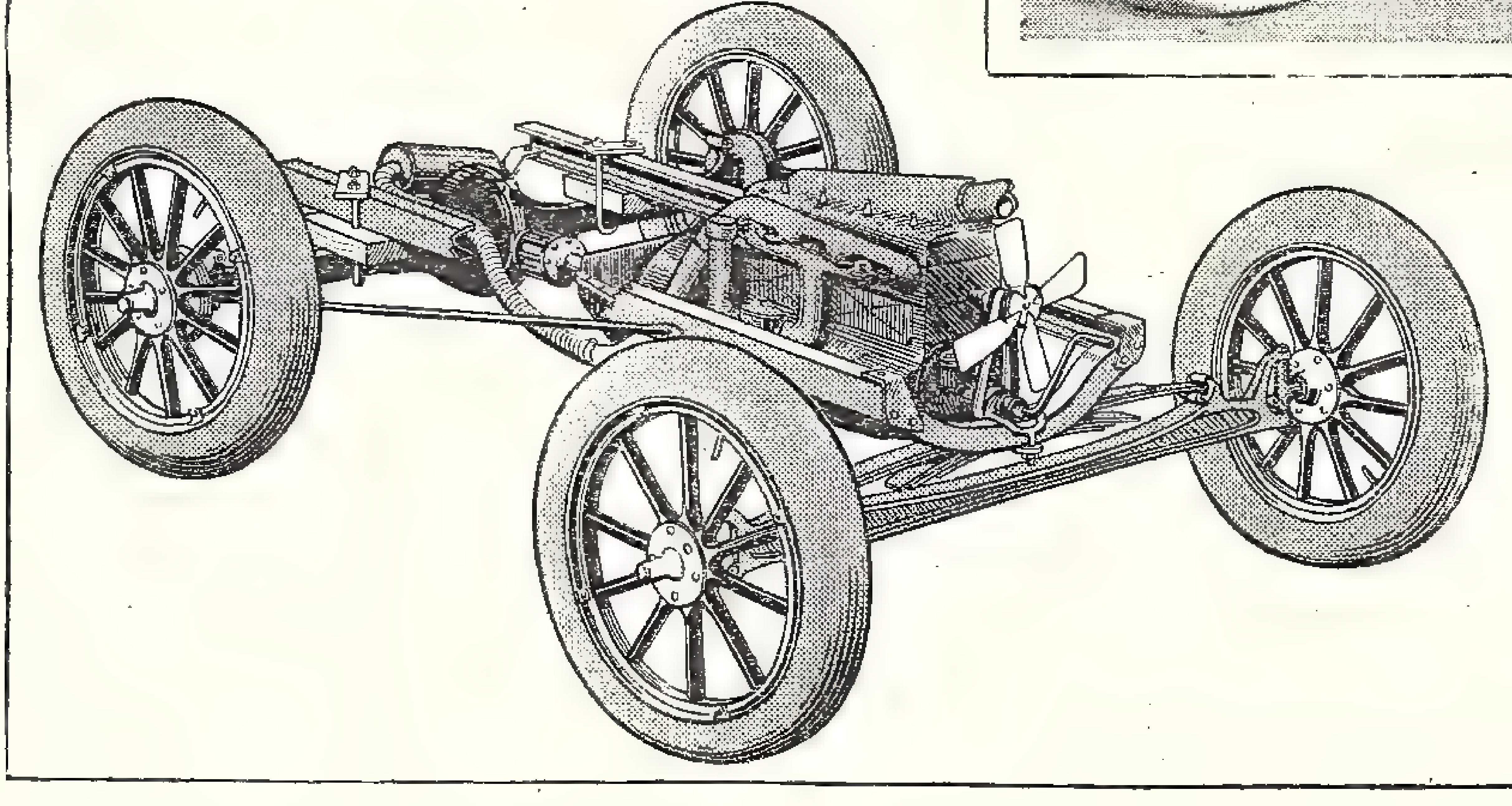
The center of gravity is so near the axle that when car suddenly starts the front end goes jack-rabbity.



The photo above shows the muffler tucked in at right angles, U bolts over rear axle, and sawed off frame.



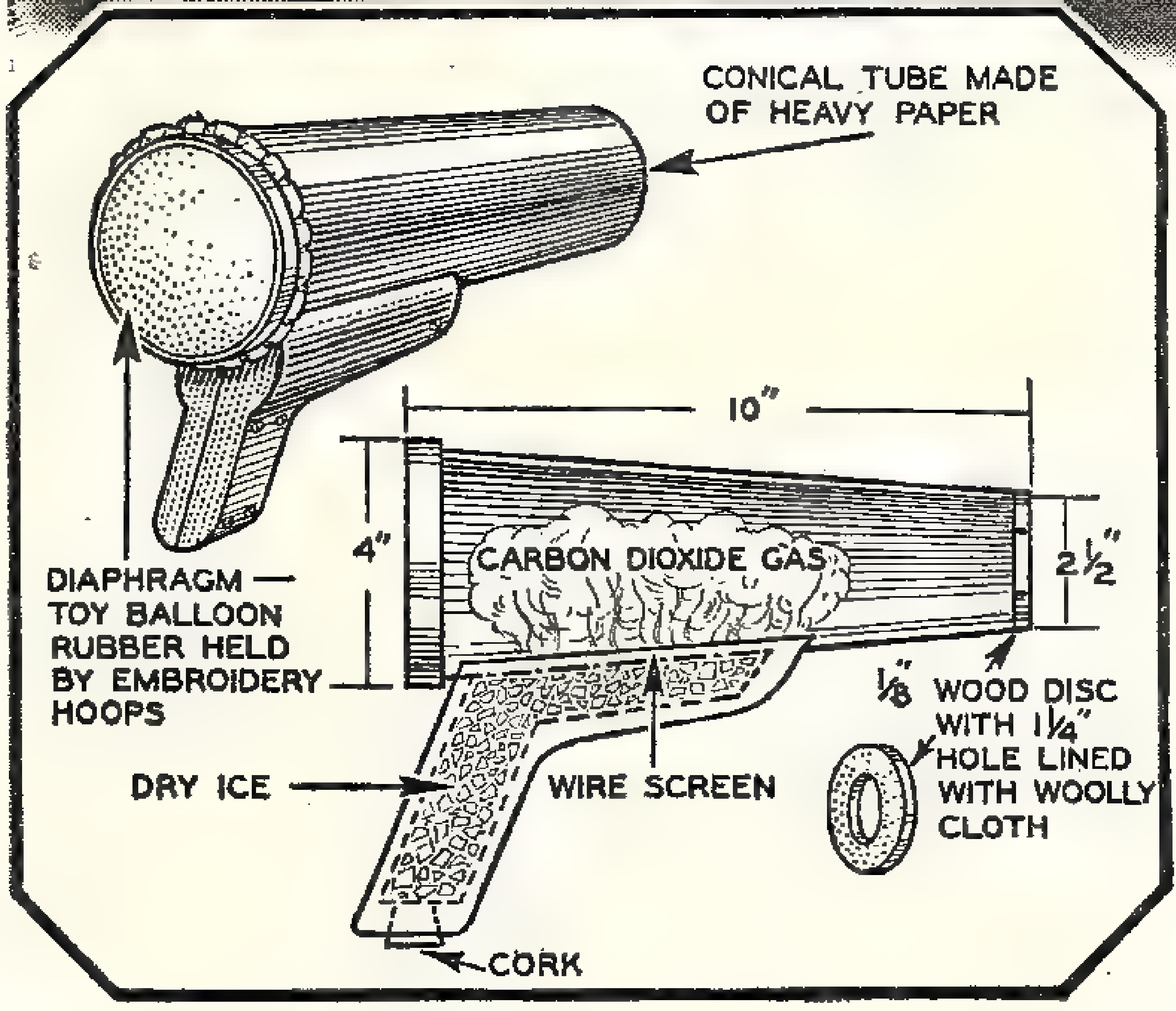
Above is shown the way the rear axle is moved up against the universal joint on the motor and how the radius rods are led forward to the frame. Left, how pillow blocks and U bolts fasten the axle to the frame. No rear springs are used. Flexible metal hose is used for exhaust pipe. Radius rods are welded to the frame alongside the motor. The body is bolted back on the frame. The floorboards and all present equipment will fit the altered job.



Showing dropped front end with spring pile reversed, U bolts holding axle to frame, and exhaust.

Bring "Ghosts" to Your Home

The author demonstrating how the gas rings travel. Incombustible carbon dioxide is here extinguishing candle flames.


CONICAL TUBE MADE OF HEAVY PAPER
10"
4"
CARBON DIOXIDE GAS
2½"
DIAPHRAGM — TOY BALLOON RUBBER HELD BY EMBROIDERY HOOPS
⅛" WOOD DISC WITH 1¼" HOLE LINED WITH WOOLLY CLOTH
DRY ICE
WIRE SCREEN
CORK

Construction of gun which shoots invisible, clammy rings of ice-cold carbon dioxide gas, which feel like ghostly hands.

by RICHARD COKE

The author's adventures as a "ghost detective," ferreting out the secrets of fraudulent mediums, led him to the discovery of the ingenious methods of creating phantoms which he describes in this article. Using these simple stunts, much fun can be had at house parties, and you can easily convince your guests that you are in private communication with the supernatural.

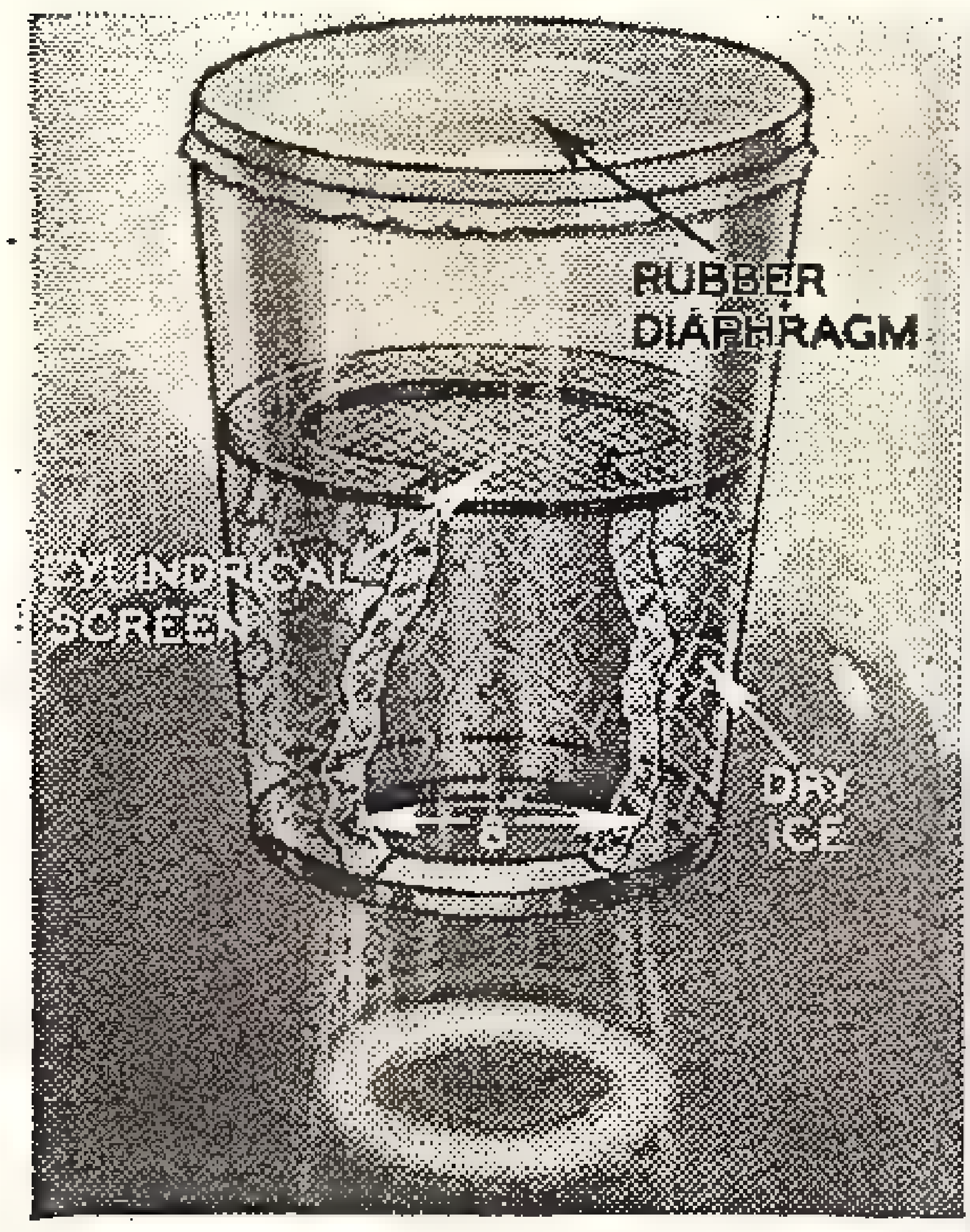
WHEN Eddie called me up from the *"Times"* office, and asked me to come along to Madame Y's "Wednesday night circle," of course I accepted the invitation. For over fifteen years I've been spook hunting, but with no *material* success. When spooks have rattled tin cans in a cabinet in imitation of a "Model T," I've always found that the spooks had bone and muscle. When nebulous images have appeared on photographic plates, I have always found the foggy patches due to exposure to X-rays, radio-active salts, or maybe to a tiny pin-hole in the bellows of the camera.

Eddie is a reporter on the *"Times."* Nosing around for copy, he had visited Madame Y's the week before. What he had seen had him absolutely mystified, so he got in touch with me to see if I could dope it out. He declared that ghosts were all over the semi-lighted room; actually brushed against him, enfolded him!

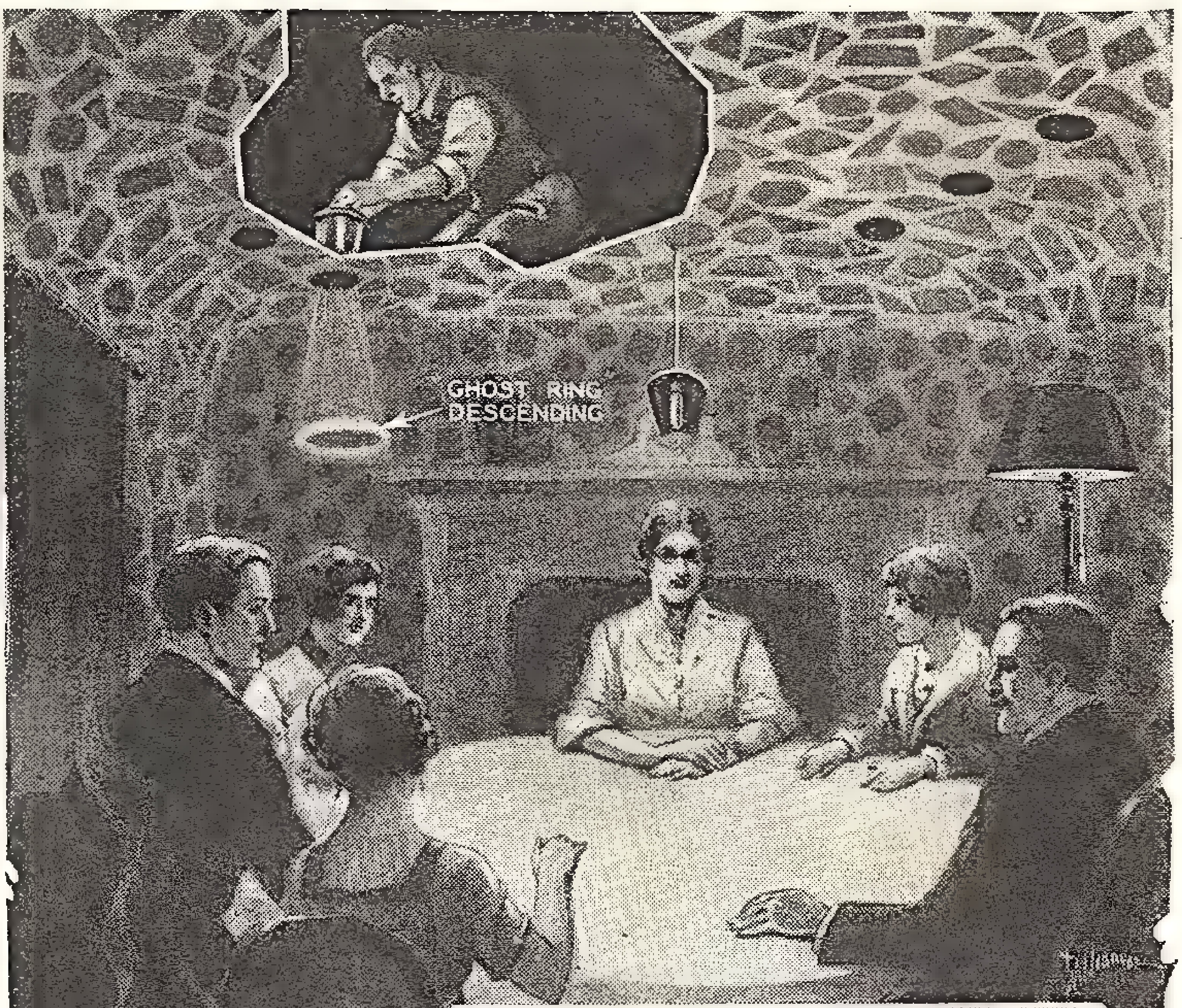
We arrived at Madame Y's. It was a big, gloomy, frame house out on Santa Monica boulevard. It was a few doors from a cemetery. I couldn't help but think that "Madame" was a good business woman: she kept her ghosts close at hand to avoid cross-town taxi fares.

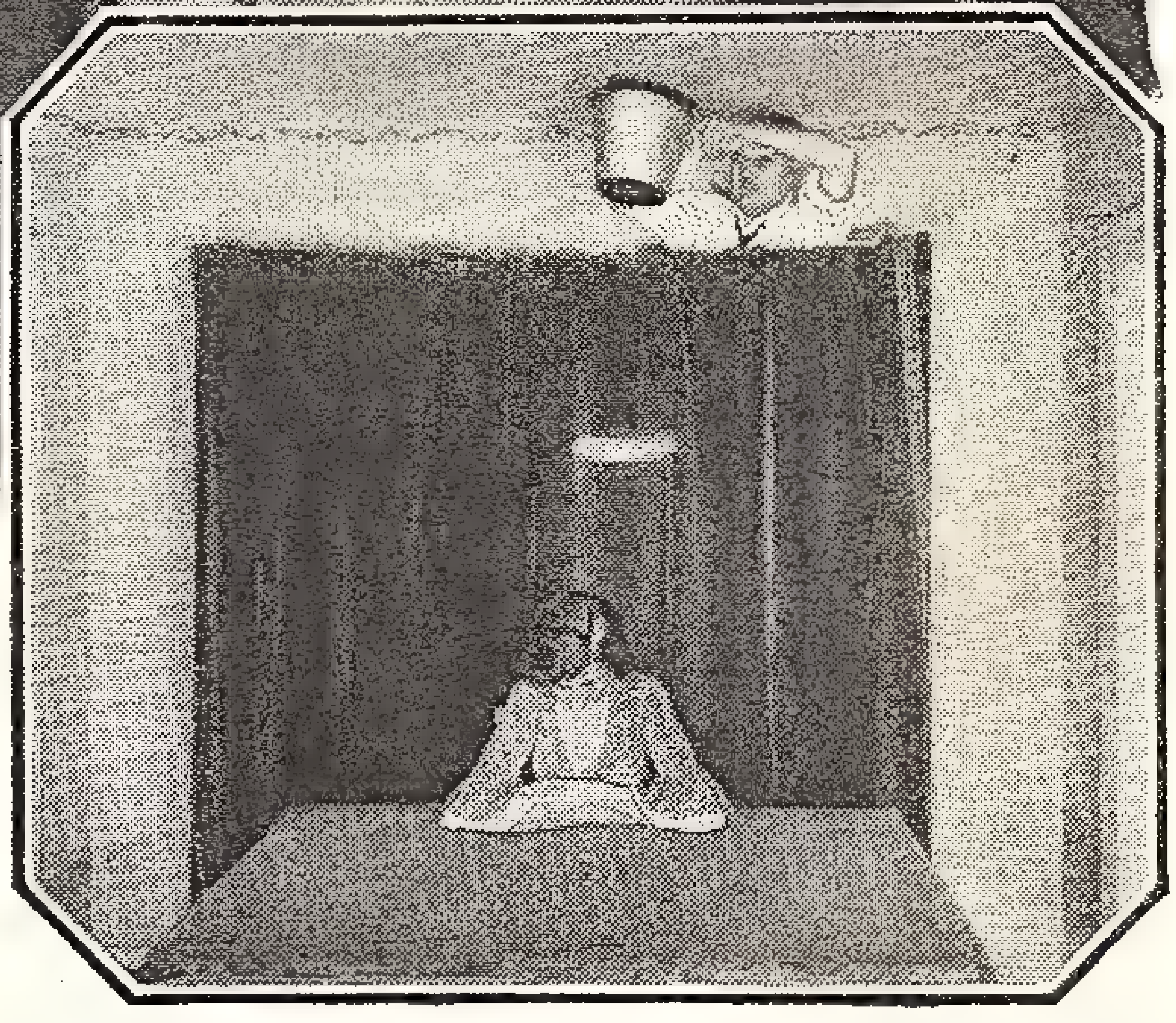
At the door we encountered the usual "spirit seance" atmosphere — a dark-

for WINTER PARTIES



Above, a gas ring mortar of the type used by the fake medium. Layout of Madame Y's seance chamber is shown at right; chafing dish dispenses vapor which supplies humidity to make visible the cold gas rings sent into room by confederate upstairs. Geometric patterns camouflage openings in ceiling.





Demonstrating how the gas ring mortar sends a halo of dry ice generated gas settling over the shoulders of subject.

skinned, loose-robed confederate, who admitted us and ushered us into a big room decorated after the motif of grandma's crazy quilts. The ceiling met the walls in a sweeping curve. Both were painted, in a variety of sizes, with the three most common geometric figures: circles, triangles, and squares.

A fairly wide table about ten feet long, and covered with a green cloth, was located in the middle of the room. There were six straight-backed chairs at each side of the table, and two at one end. At the other end, on a slightly raised platform, was an armchair—the "Madame's." I noted particularly that the chairs, and all the woodwork about the room, were finished in dull green and offered no reflecting surface.

The lighting effect was very unusual. Above the table, and about two-thirds the way between the floor and the ceiling, was a long, green, neon light tube. A semi-circular shield above the tube cut off all the upward beams of light, but diffused the lower part of the room with a sickly, green glow. Before the actual "seance" started, several floor lamps about the room were alight with conventional white bulbs.

On a small table in a corner near the "Madame's" chair, was what appeared to be a re-designed electric chafing-dish—I noted an electric cord leading to the device. It was emitting a spicy-smelling vapor. The atmosphere in the room was very humid, oppressive.

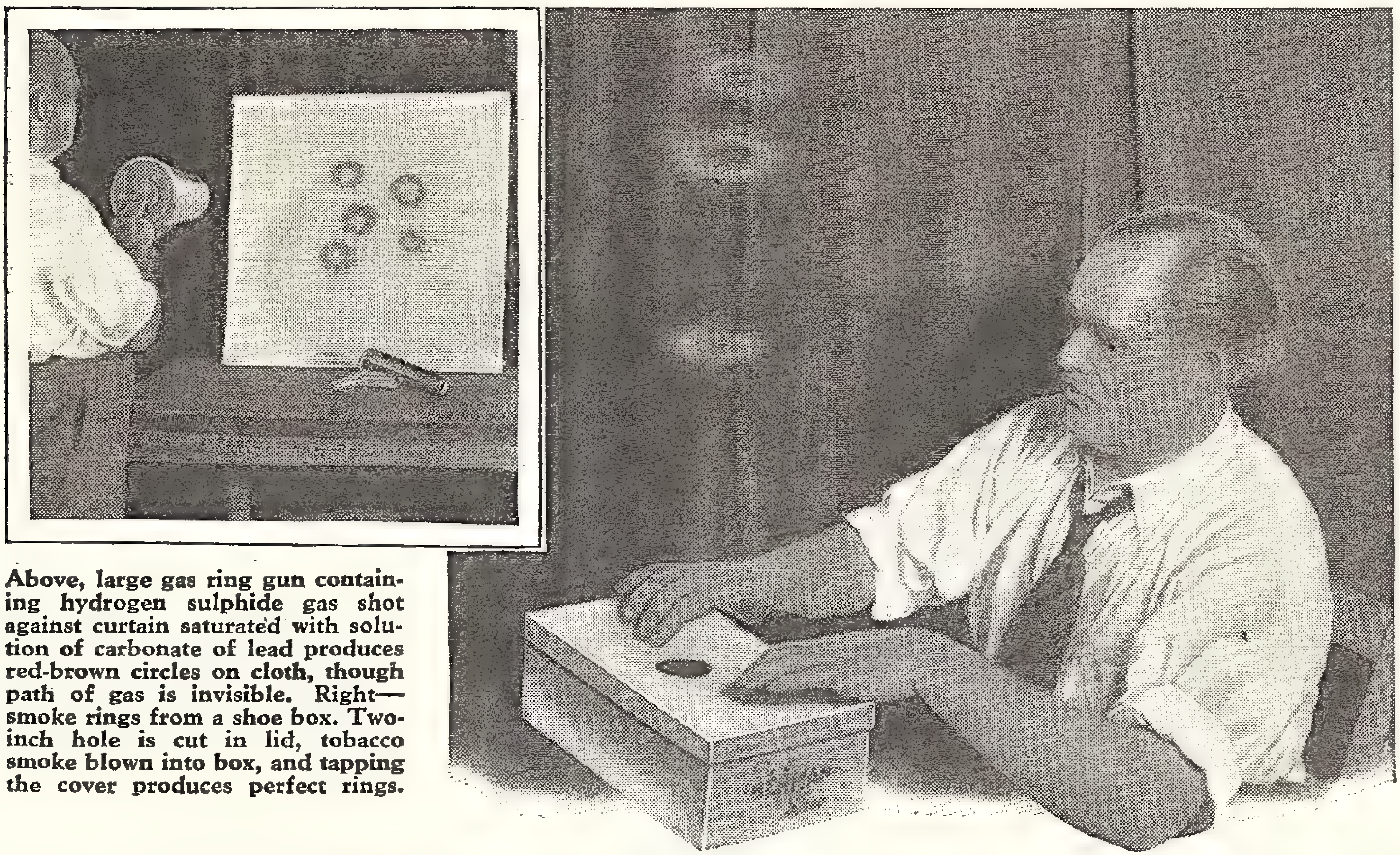
So much for the physical surroundings.

There were about ten persons in the room, mostly women. Also two half-baked-looking males. (Not including Ed and me).

Suddenly an awed silence. "Madame" swept into the room with ill-cultivated grace, and wedged her portly form into the armchair at the head of the table. The "circle" was called to order. The word "circle" struck me kinda funny. Why not call the meetings the "Wednesday night rectangle?"

After we all were seated, "Madame" went through a lot of superfluous palaver, lead-

Shoe Box Makes a Smoke Ring Generator; Unseen Rings Made Visible



Above, large gas ring gun containing hydrogen sulphide gas shot against curtain saturated with solution of carbonate of lead produces red-brown circles on cloth, though path of gas is invisible. Right—smoke rings from a shoe box. Two-inch hole is cut in lid, tobacco smoke blown into box, and tapping the cover produces perfect rings.

ing up to the sacrilegious suggestion that we bow our heads and ask the Holy Ghost to give us this night manifestations of contact between the quick and the dead.

Then she asked who wished the first "manifestation." Eddie chirped up. He wanted "contact" with his first wife. Ed's never been married. The "Madame" proceeded to induce "Mabel's" ghost to pay him a visit. Ed was told to concentrate his thoughts on "Mabel," while the rest of us were told to focus our eyes on his forehead, and center our thoughts upon the materialization of poor Eddie's departed mate.

A tense, strained silence! No one seemed even to breathe. Suddenly I blinked my eyes. What was that filmy something emerging from the curtain of darkness above? A nebulous halo! Writhing, gently rolling, it settled down on Eddie's head. It flowed down about his head and shoulders. Was it material substance . . . or what? Ed knew the moment of contact. I saw him shudder and catch his breath. And his face paled. The filmy "ghost" enfolded his body. Then it dispersed into nothingness.

During the demonstration "Madame" sat rigidly with eyes closed. Now she opened them. She brushed her hand across her brow. It came away damp. She, too, was perspiring freely.

"Did you receive the contact?" she asked. Ed nodded and "Madame" smiled triumphantly. "Who will be next?" she asked. I volunteered.

The same old rigamarole. I sat poised waiting for the ghost of my grandmother who had raised me from infancy. The fact of the matter is that my grandmother died long before I was born.

I kept looking at Eddie, across the table from me. By watching his eyes I could tell when the "ghost" was coming. Suddenly I saw his eyes focus to a point above my head. I knew "grandma" was descending.

The "ghost" came down! Feel it? I'll say so. Like a draught when an ice-house door is opened. The perspiration on my forehead felt like sleet pellets. As the foggy substance settled down over my face, a haze came before my eyes. I sniffed, but could smell nothing. But my lungs tingled, and there was a slight acid taste in my mouth. I lowered my eyes and watched the "ghost" slip off my lap and dissipate in filmy streamers. Then "grandma" vanished entirely.

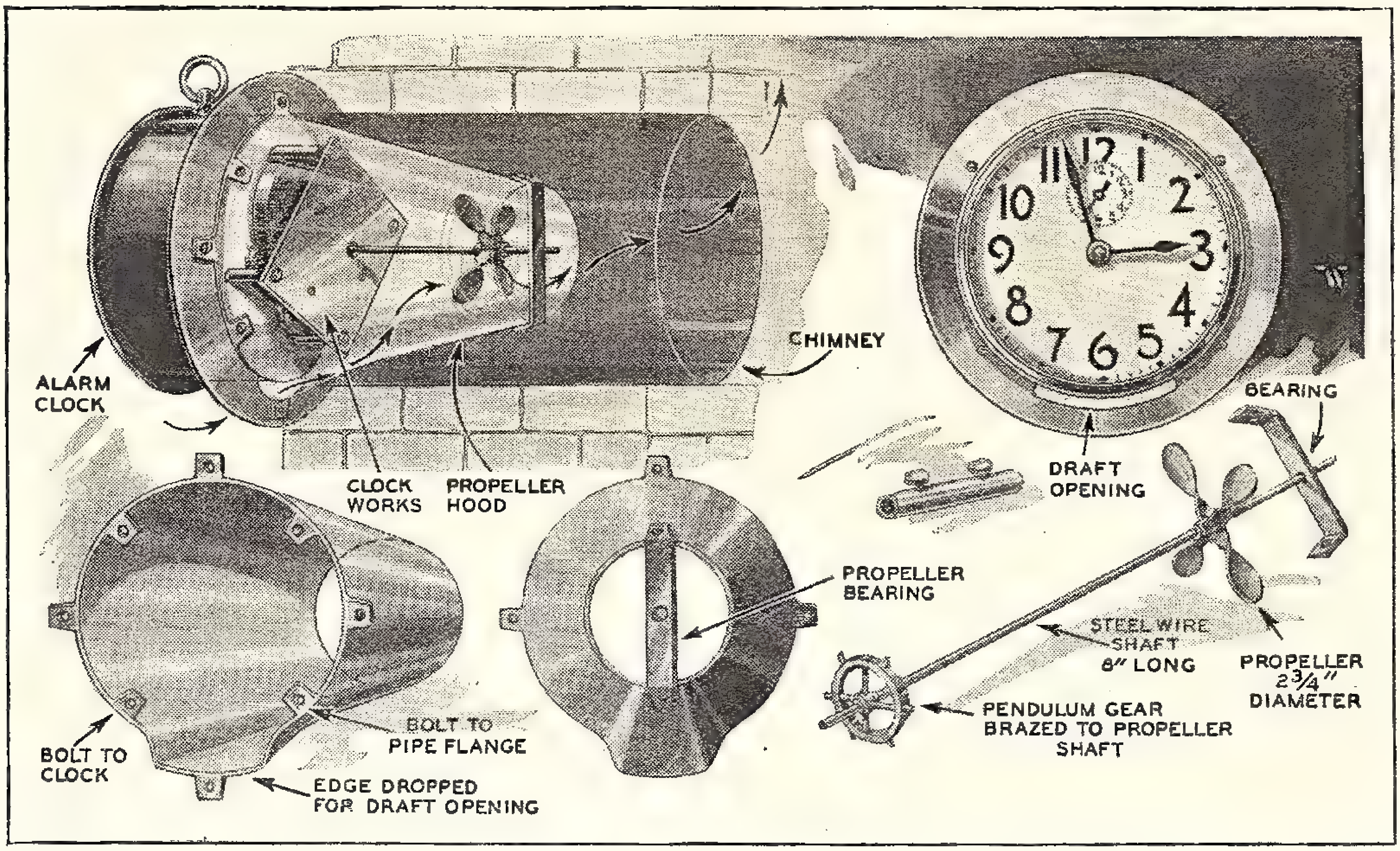
The next volunteer for a "manifestation" was an over-rouged, dreamy-eyed woman seated at the end of the table opposite "Madame." She wished a visitation from the spirit of her dear, departed husband. "He" came down. But they must have bootleg gin even in spook-land. His spirit didn't settle down nicely over her head. It came down at an angle and brushed against her bare arm. At the contact the woman let out a squeal and threw a faint—a synthetic one, I believed.

"Madame" clapped her hands. The dark-face, turban-headed butler rushed in. "The doors! The windows! Give us air! Fetch the smelling salts." He did her bidding. Blasts of welcome fresh air entered the room. "Madame" unwedged herself from the chair and moved to the stricken woman. *On the way I saw her switch off the electric chafing-dish!*

The woman came out of her swoon. The seance was resumed.

(Continued on page 138)

Chimney Draft Winds Automatic Clock



The drawings above give construction details for the self-winding alarm clock that fits in chimney flue. Assembly of parts is shown in the illustration in upper left corner. Pointed arrows indicate path of draft.

THE best of clocks will stop running if not wound at certain intervals. The inconvenience connected with this fact may be easily overcome by rigging up the self-winding clock described here.

After determining the alarm clock you wish to use, hold the key in winding position so it does not touch the catch which keeps it from unwinding. If the clock still runs, you will have the better of two types possible to use. Should it stop, however, it is necessary to remove the spring and dog which keep it wound.

Taking for granted you have the first type, the next step is to secure an old alarm clock no longer useful. From this, remove the pendulum, balance wheel, hair spring and all the alarm gears as none of these are used. Take the little gear that operates next to the pendulum and braze a piece of steel wire to the end of the shaft opposite the winding side. This serves as the propeller shaft and should be about 8 inches long. Next remove the time gear spring and fasten securely to the propeller gear so that it will not turn within itself.

The Second Type Alarm Clock

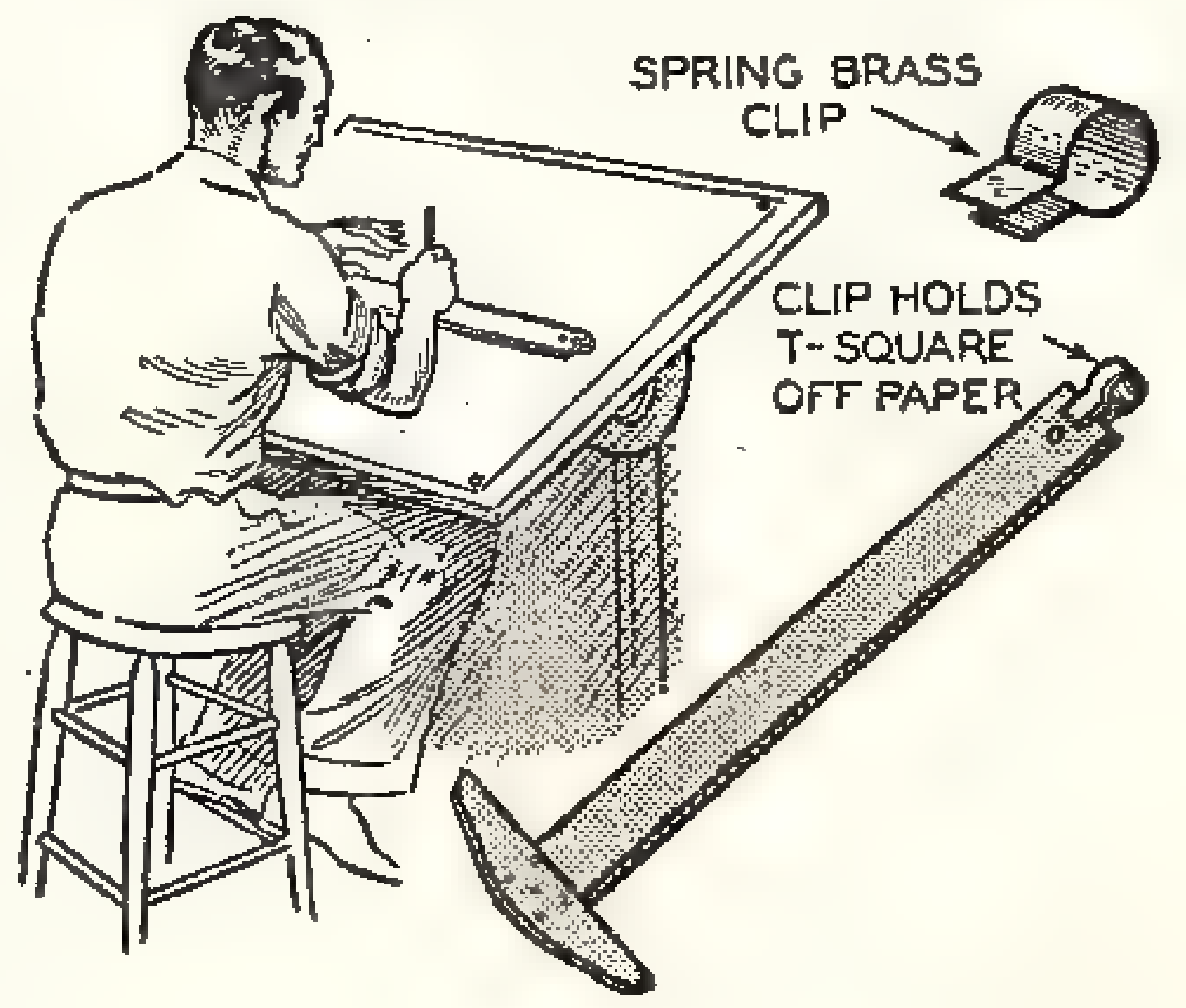
If you have the second type of clock, this performance is reversed. Leave the spring in the clock works that you are using for the train of gearing and remove the spring in the clock you are using for time. Make the shaft and gear of the latter secure so that it will not turn within itself.

Returning to the other type of winding clock, put the train of gearing together in its frame. Test it from the propeller shaft to see that it works smoothly. The next step is to place the two winding posts end to end, fastening them together with any ordinary radio wire coupler that has set screws. Drill the opening in this coupler to fit the respective winding posts. When this is accomplished, fasten the frame of the train of gearing to the clock used for time.

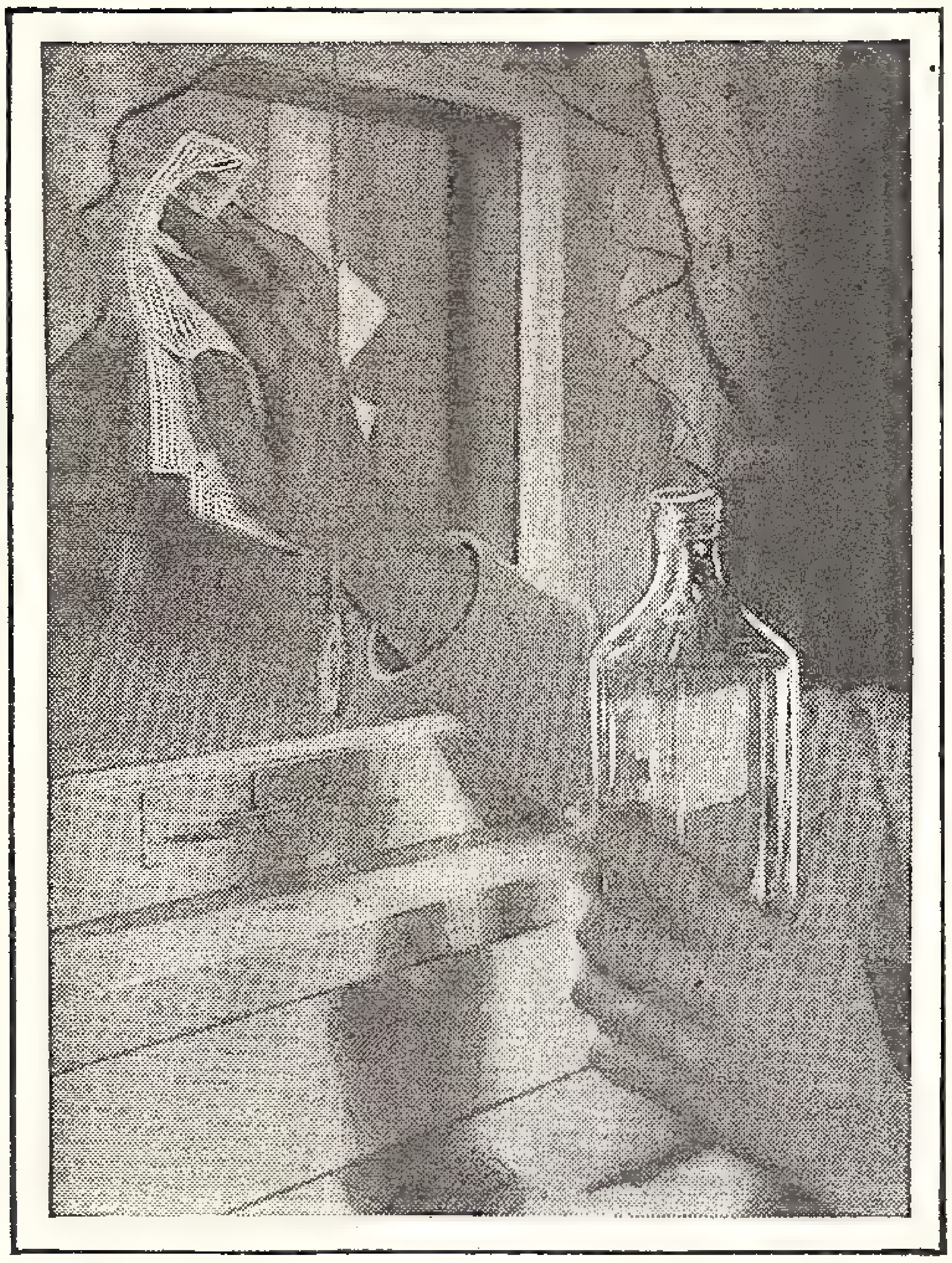
When shaping the funnel hood, allow for flaps to bolt to pipe flange and clock. Also, a drop in the lower edge to permit the draft, that turns the propeller, to enter. Arrange a sliding shut-off in this opening with which to regulate the amount of draft.

Anti-Smear Stunt for Draftsmen

DRAFTSMEN know how disheartening it is to get a drawing finished neatly then suddenly ruin it with a swipe of a T-square on the edge of which a bit of ink has collected from the ruling pen. The way to prevent these disasters is to attach to the end of the T-square a spring brass clip as illustrated in the drawing at the right. This will hold the edge up off the paper and prevent smearing. The clip may be easily removed when the T-square is not in use.

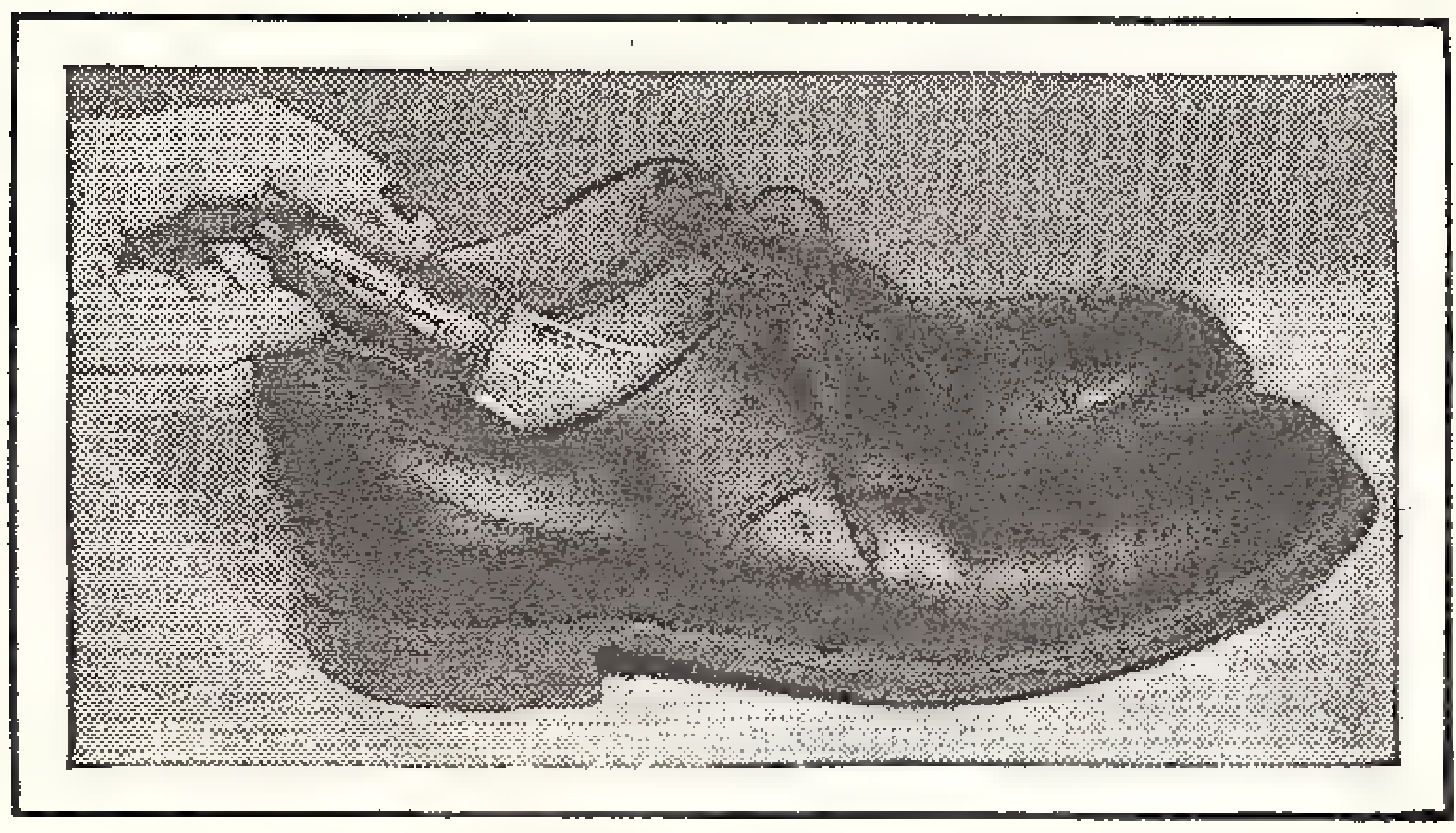

SPRING BRASS CLIP
CLIP HOLDS T-SQUARE OFF PAPER

HELPFUL IDEAS for the



Non-frosting Windows

With winter upon us, the seasonal necessity of enduring frosted windows or those which steam up when cooking is done is with us again. This annoyance can easily be done away with by purchasing twenty-five cents' worth of glycerine from your drug store. Apply this to the glass with a rag. The thin coating it leaves offers no surface for moisture to accumulate upon.



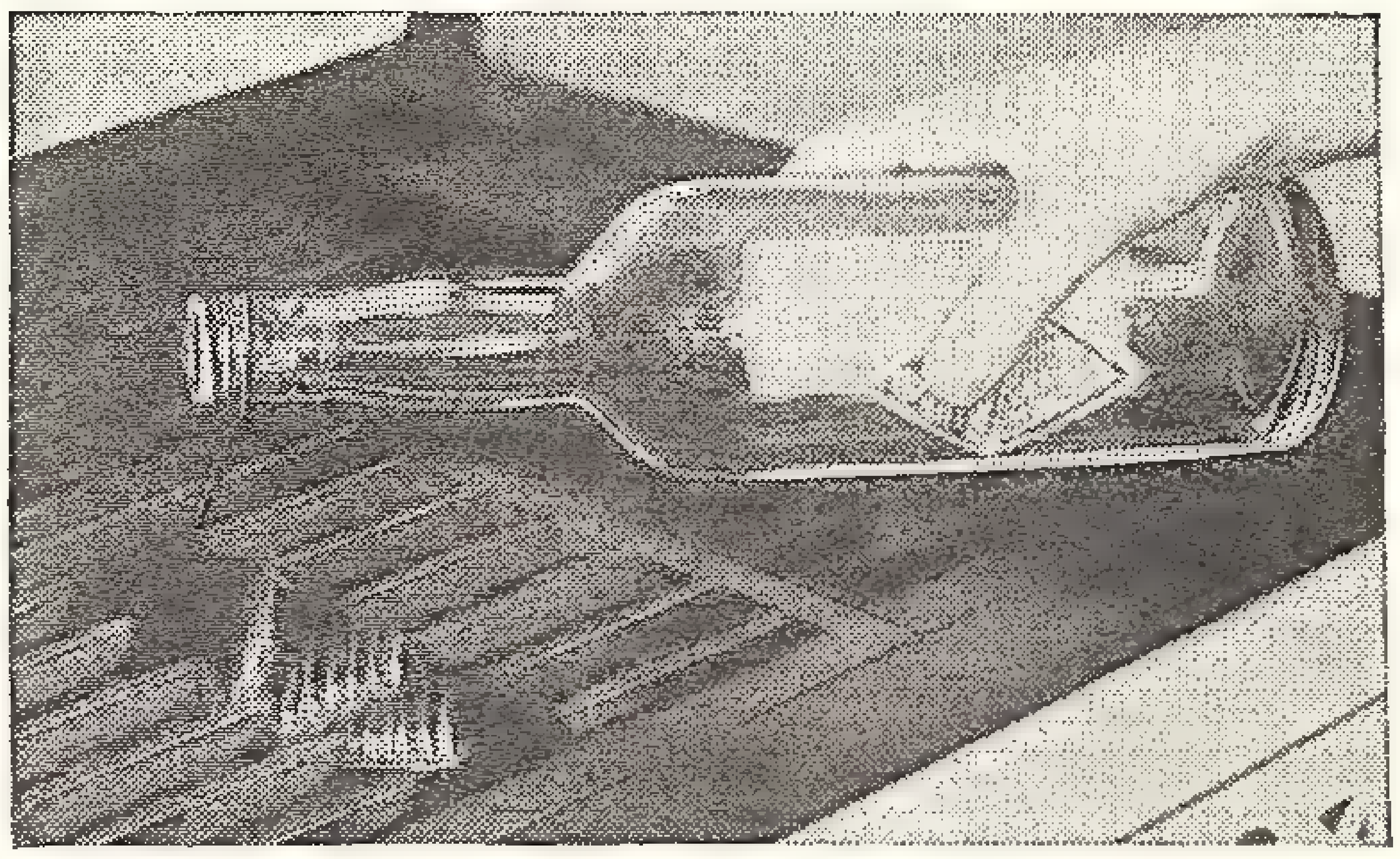
Drying Shoes With Light Bulb

Wet shoes should be dried from the inside rather than by baking in a hot oven, which always results in such damage to the leather that its useful life is cut short, though the owner may not be aware of it. A ten-watt electric light bulb placed directly inside the shoe, as shown above, makes an excellent drying medium. Higher powered bulbs should not be employed, for they dry out the leather too quickly, with deleterious results.

Repairing the Gas Range

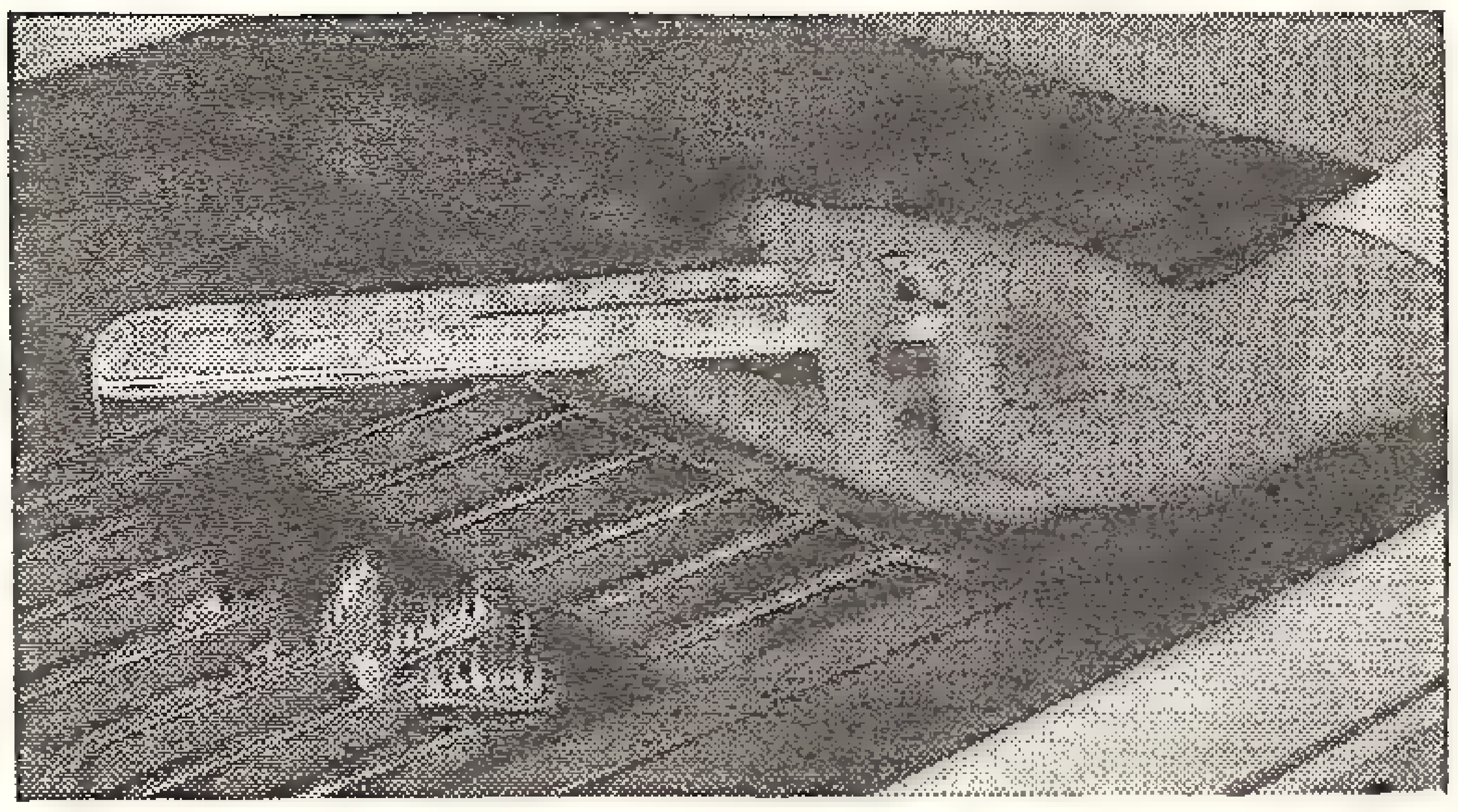
Cleaning gas burners generally restores the efficiency of the kitchen range. The burners should be removed, carefully brushed and scraped, and darning needles run through each small aperture. Then the burners should be boiled in sal soda. They should be carefully dried by heating before returning to place.

If the pilot light on your gas range gives continual trouble, cut a hole about three-quarters of an inch across in the top of the cap which covers the pilot. If you suspect a gas leak in the house lines, make sure that all gas cocks are turned off, then watch your gas meter. If any of its hands move, begin looking for the leak.



Removing Glass Stoppers

This method of removing stuck glass stoppers from bottles is one of the most efficient known. A heavy copper wire is wound around the bottle at the point of the stopper, and a long end left to dangle in a gas flame. Heat will flow along the wire and expand the bottle neck so that the glass stopper falls out easily.



Easy Thermometer Repair

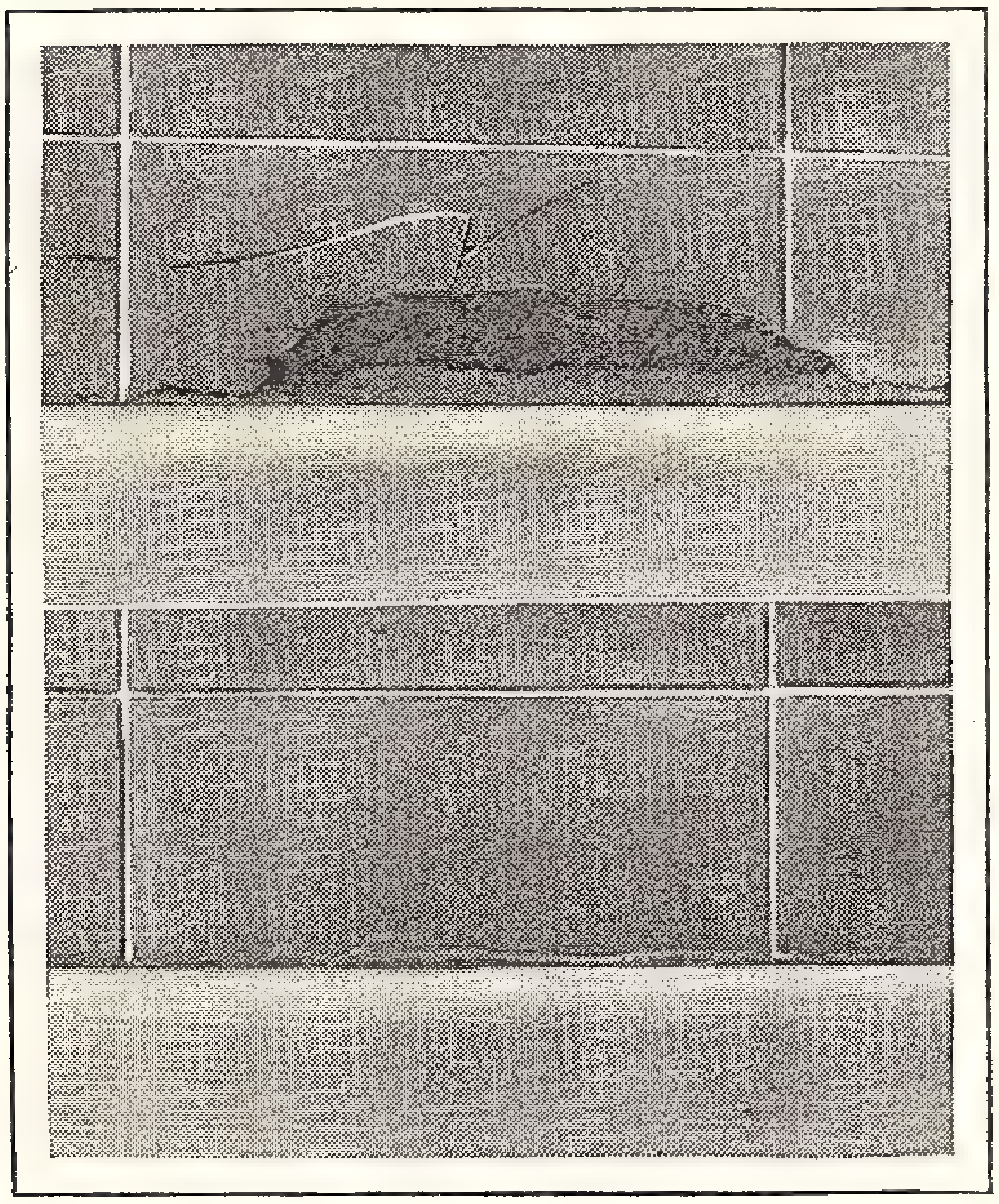
Through mishandling, the mercury column of a thermometer sometimes becomes separated. By heating the stem of the thermometer gently over a subdued gas flame, and striking the instrument end-on against the palm of the hand, the broken column can usually be reunited.

HOME FIX-IT MAN

For Frozen Pipes

If you have a water pipe that freezes in extremely cold weather, try covering it with felt, asbestos, or cork; then allow a small stream of water to trickle from a faucet near the danger section, to keep up movement in the pipe.

If pipes are found frozen, prepare to shut off water pressure if a fracture is discovered. Then warm the pipes from the faucet end with a small blowtorch or other heating element. Heat applied should be gentle and should not be concentrated on one section of the pipe, but moved gently back and forth. Burlap sacking wound around the pipe and saturated with hot water is effective. Sometimes a candle gives sufficient heat. Be careful not to set fire to adjacent woodwork.



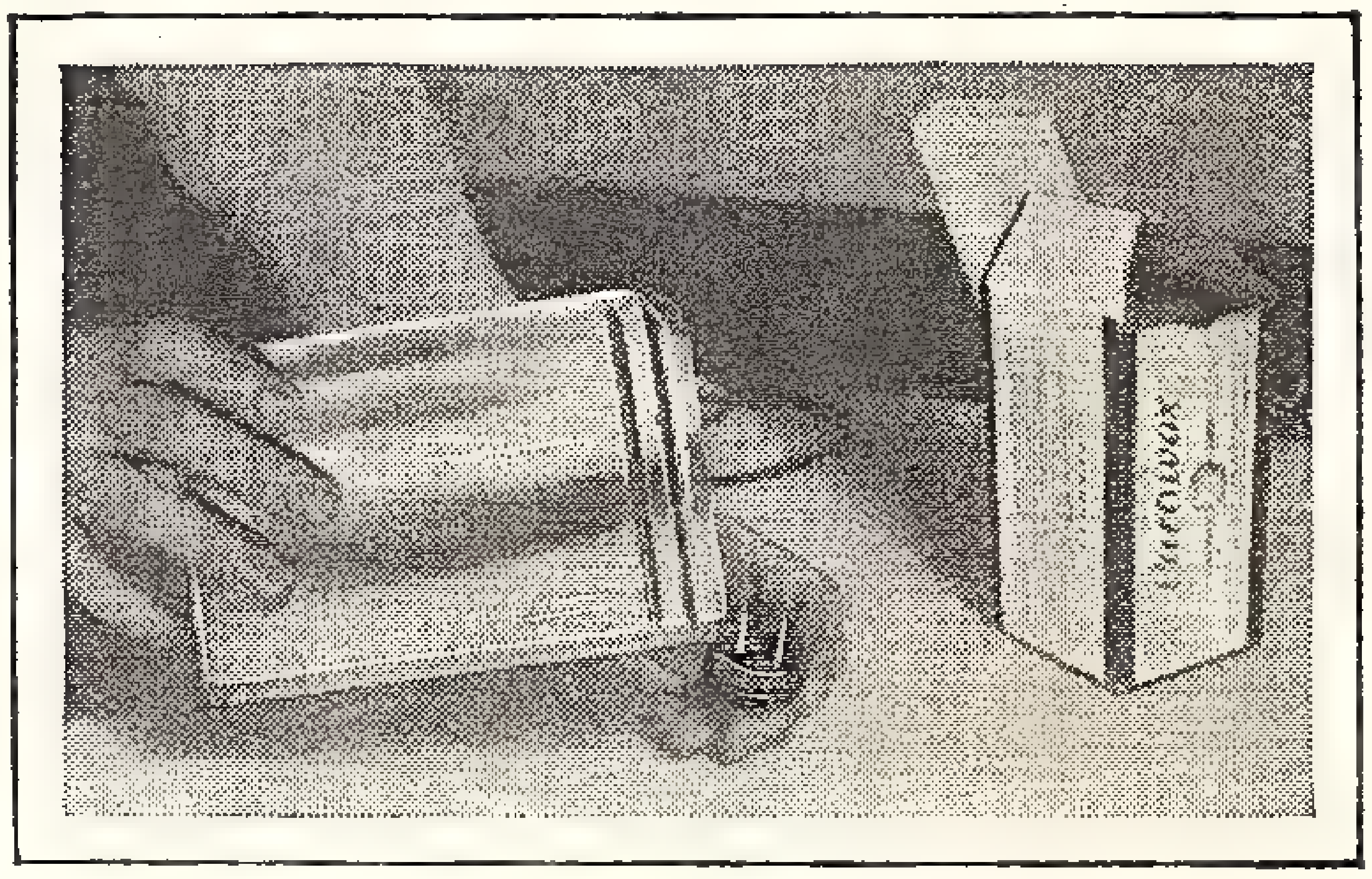
Plaster Repair Kinks

Broken plastering is one of the most common ailments of the interior finish of the home. The upper section of the above photo shows a crack in a tiled wall along the edge of a bath tub. The lower section shows the same spot repaired with a filling of plastic wood, which was smoothed into the opening, permitted to harden, and then coated over with a layer of enamel to match the wall. Because it is already mixed plastic wood affords a quicker repair to such breaks than regular plaster.

Every home has various accessories mounted to the walls by screws, which frequently pull out, leaving a ragged hole in the plaster. Plastic wood can be used to fill up this hole, leaving a solid base into which the screw may be forced, or a wooden plug can be driven in and screw reset.

Vegetables Preserve Flowers

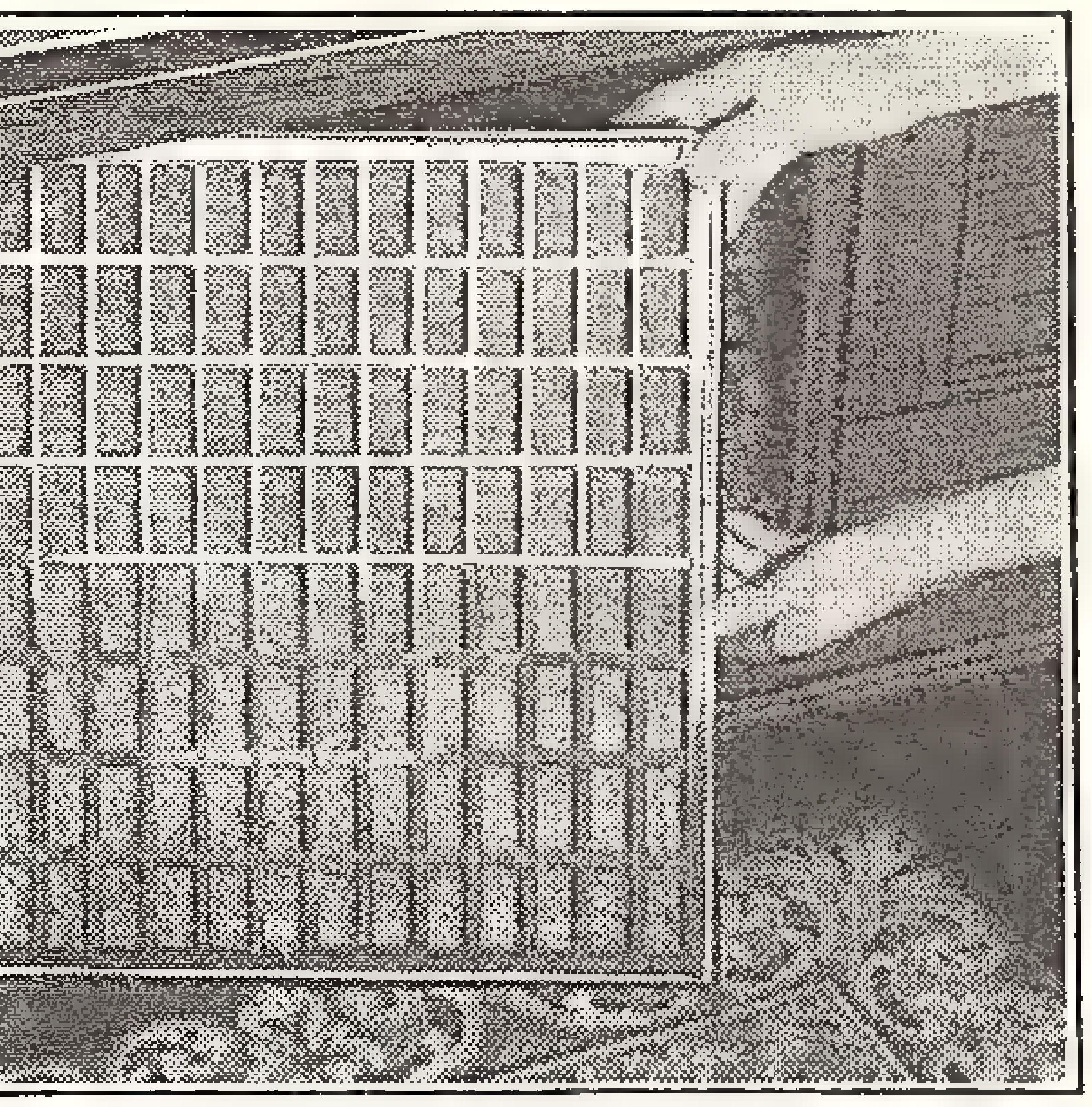
An old method practiced in New England for the preservation of cut flowers is to mount them in a good-sized fresh potato, cucumber, beet, or other solid vegetable. A sharp lead pencil or pointed instrument is used to punch one hole in the vegetable for each flower stem, which is inserted therein. The whole is then set in a vase with water sufficiently deep to cover the base of the stems. It is said that flowers will keep twice as long as usual when this method is employed.



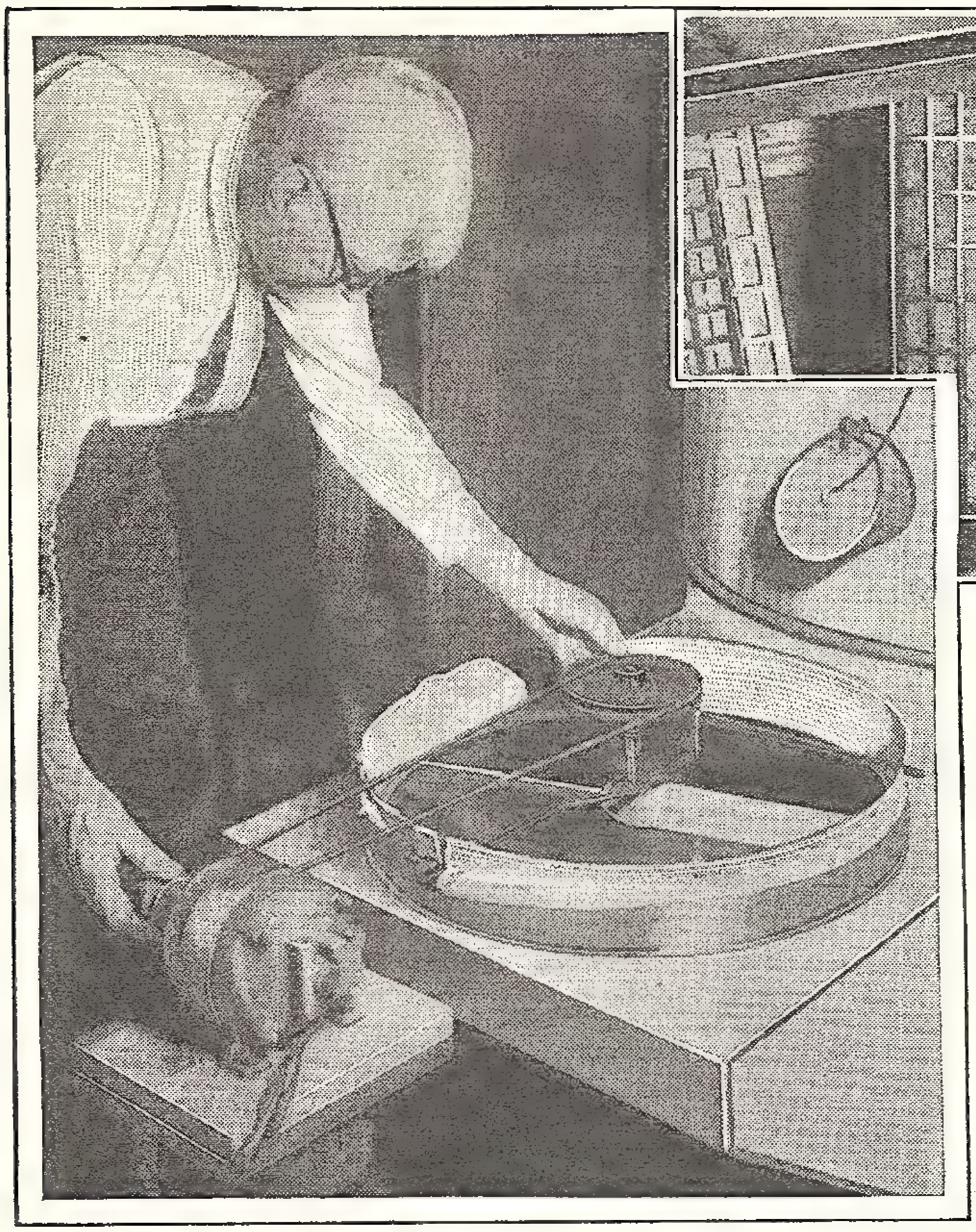
Preventing Short Circuits

When the little strands of wire inside an electric plug work loose they often come in contact with the other side of the circuit and produce short circuits. This may be prevented by filling such plugs with melted sealing wax, sulphur, or just plain household paraffin. Tar or pitch will also serve equally well, and once set in place afford sure insurance against short circuits and possible fires. The melted material used should be fairly hot so it will flow freely into all of the interstices.

Cut Your COAL Bills With



These air filter pads, inserted in the outlet pipes in the various rooms, will go a long way towards bettering health and cutting down cleaning costs for draperies and curtains. The fine spun glass removes all the fine particles in the air.



Here is the ventilating fan in position beside the cold air duct and ready for action. The prop is supported by three iron bars which rest on the edge of the pipe. Make the holes for the belt as small as possible.

YOU'D be surprised to learn how wasteful the average furnace is. Because the air tends to stagnate in the pipes, there is a lot of heat expended for other purposes than warming the air.

Here's a simple little stunt, however, that will go a long way toward substantially improving the efficiency of your home heating system. The contrivance can easily be rigged up in any home workshop and applied to the furnace in a few minutes.

Fan Keeps Air Circulating

The function it serves is that of keeping the air in circulation in the pipes and hence in the rooms. Every possible calory of heat is utilized, making for a great saving in the coal bills, perhaps a ton or more a season. And a ton is easily worth saving in these times.

The initial outlay will run you slightly more than the price of a ton of coal, but when next winter rolls around again you will be able to put the money-saving device into operation without any cost whatever.

In addition to all this, however, a great benefit will accrue in the form of health betterment. This is made possible by the employment of special filter pads which have recently been put on the market. Made of fine spun glass, as illustrated in the photo at the top of the page, these pads filter out all dust and other dangerous particles which would otherwise be sucked up into human lungs.

Not only that, but a great saving in the cost of drapes, curtains, etc., is made possible, since most of the dust is extracted from the air by the pads.

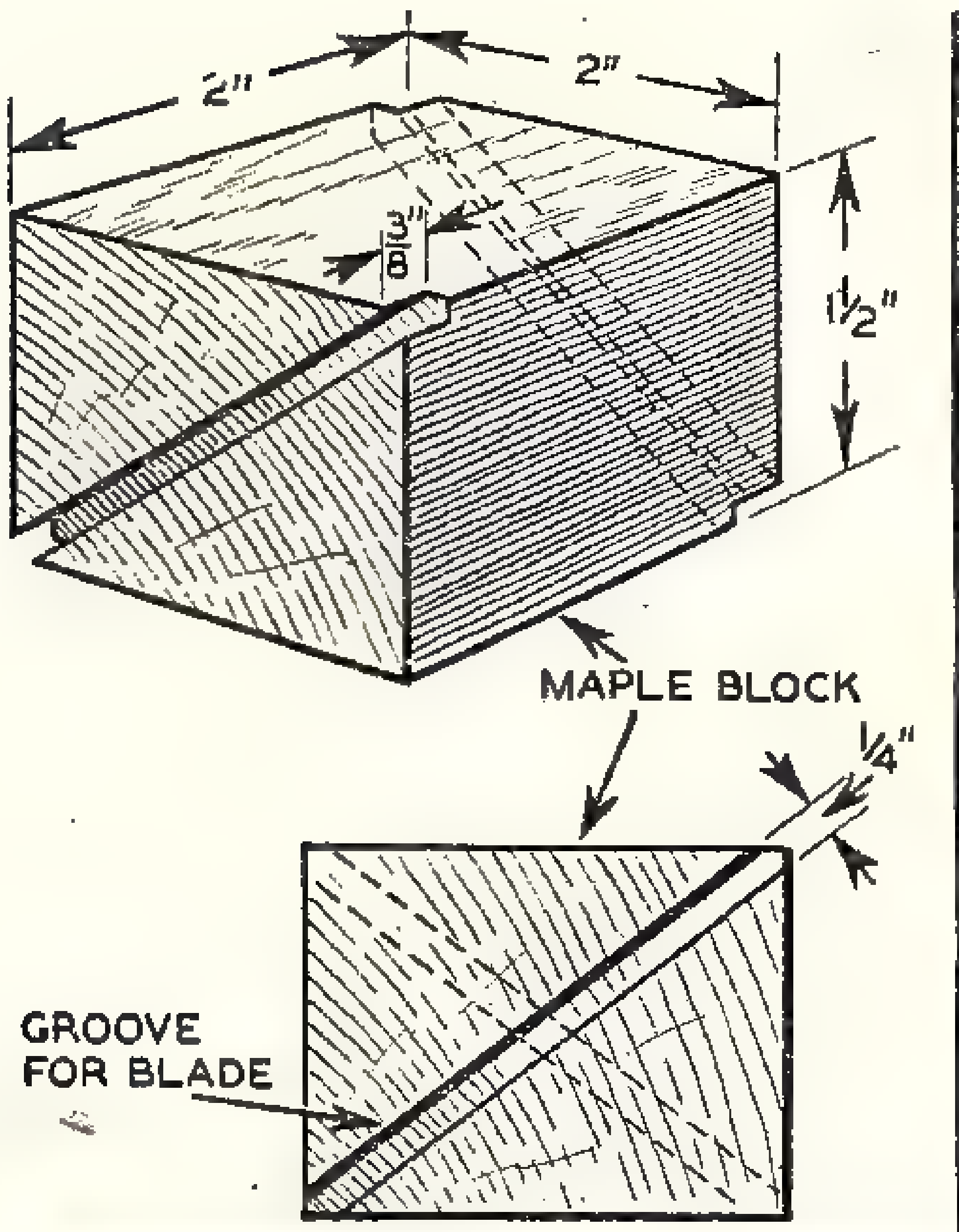
Now let's get down to the actual construction of the contraption. First on the agenda comes the fan, which is really the heart of the ventilating system. The hub should be made from a block of hard wood—any kind you have available. On two sides as illustrated in an accompanying drawing, cut a groove of the dimensions given. This is to take the fan blades.

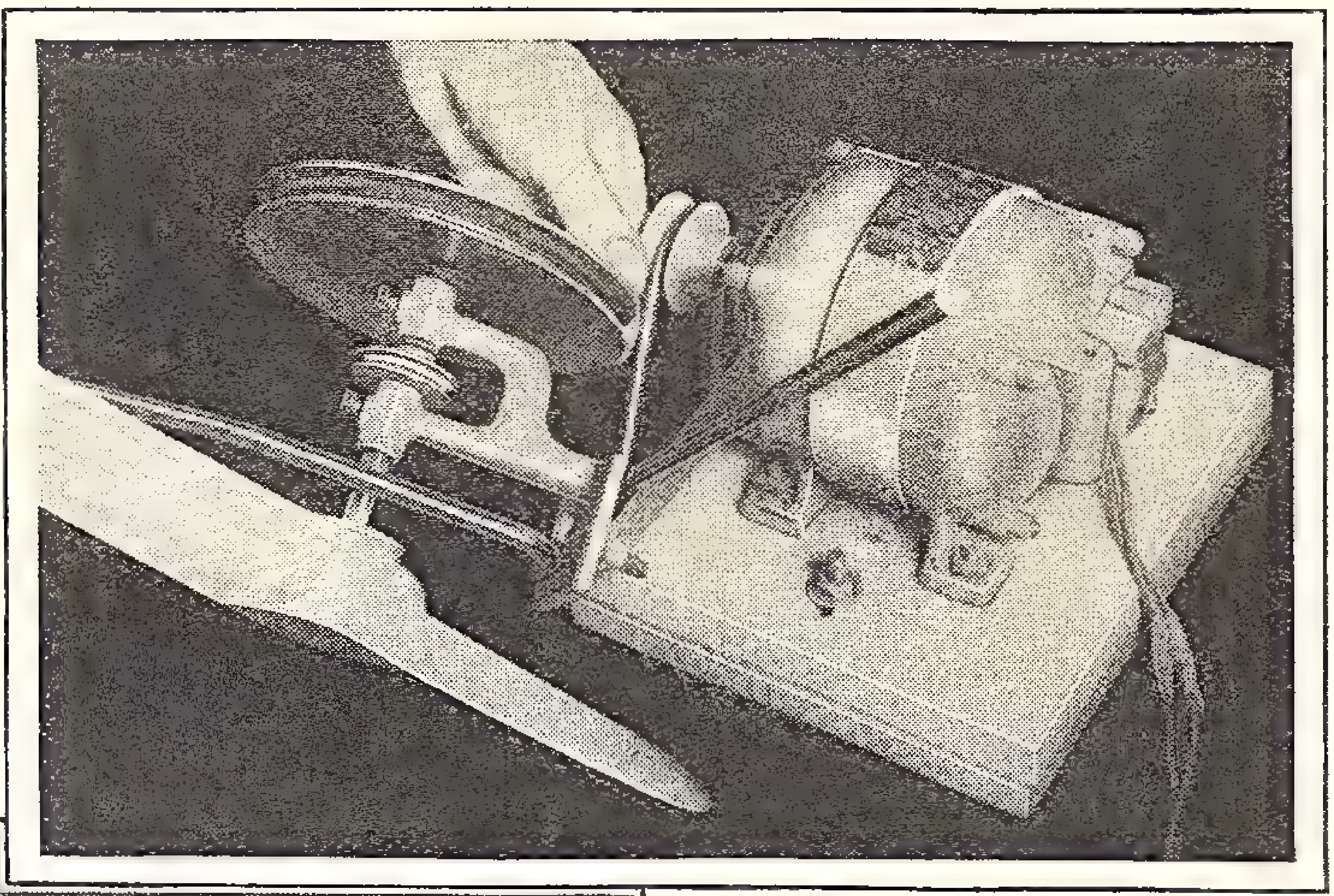
Use Hard Wood for Blades

These blades may be made from any hard wood, three ply veneer being quite all right for the job. They should be cut to about the shape given in the accompanying photo. Form the blades so that the widest portion is at the bottom, with a tapering form running towards the tip. The length of the blades should be such that the diameter of the entire prop is about an inch less than the diameter of the pipe into which it is inserted.

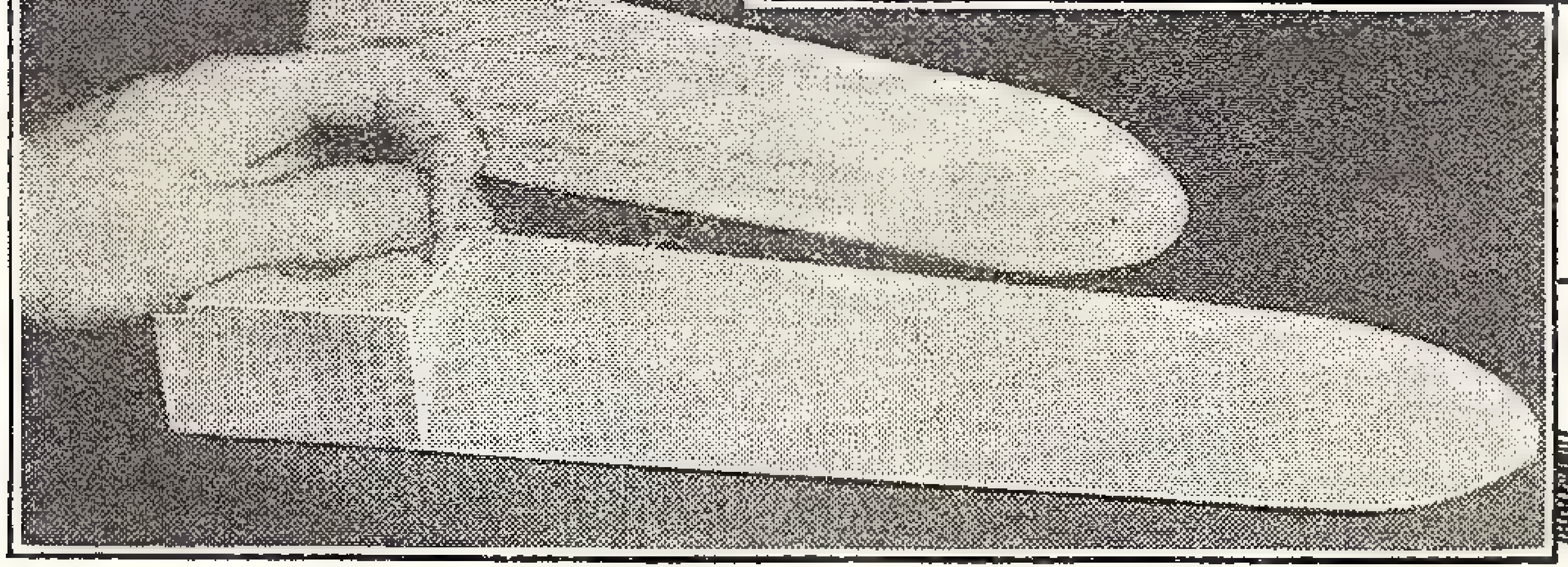
The blades are secured to the hub by first smearing the groove with glue, then inserting the butt of the blade and clinching the bargain with a couple of finishing nails. Of course, the blades are to be set at opposite angles.

FURNACE Ventilating Fan

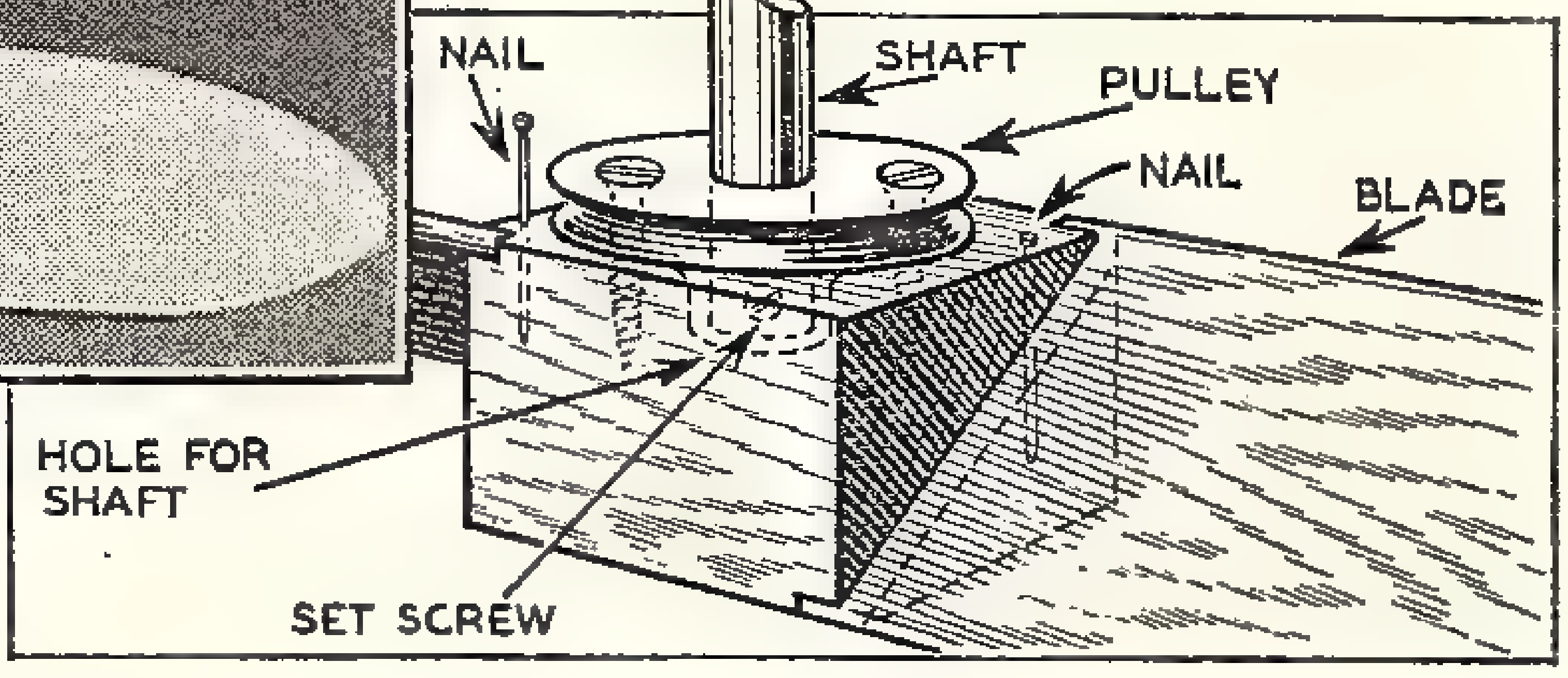




All parts of the ventilating system are seen here. The shaft for the fan revolves in a bearing made from lathe headstock.



The fan blades are shaped as illustrated in the photo above. The butt end is glued and nailed into the grooves in the hub block. At right is seen how the pulley to take the shaft is secured to the hub block. A set screw holds the shaft firm, to prevent play and wobbling.



The completed propeller is secured to the shaft upon which it revolves in the manner illustrated in the accompanying drawing. It will first be necessary to bore a hole in the hub to take a short section of the shaft. Then to the hub is screwed a pulley having a collar and set screw. Make all these parts firm, since they have to stand a lot of wear and tear.

This entire element of the ventilating system rotates in a bearing made from the head stock of an old lathe, which may be procured at any 5-10-25 cent store. Or if you can't procure it there, write to Modern Mechanix and Inventions editors, and they will be glad to give you purchasing data.

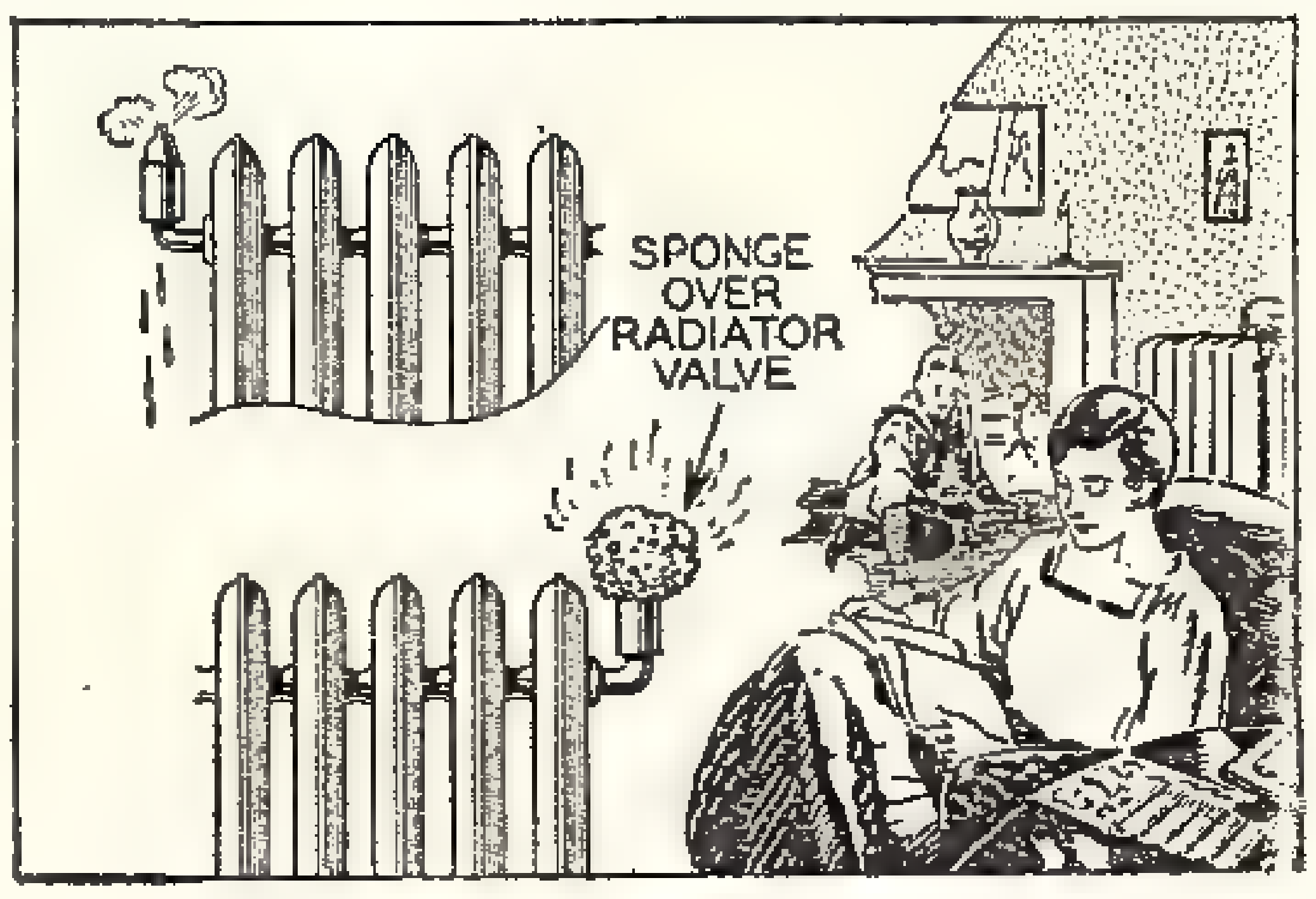
Two iron bars, secured to the bottom of the headstock, as illustrated in the drawing at the top of the page, serve as supports for the bearing. The ends of these bars rest in the metal on the periphery of the cold air duct, this latter part being wrapped with asbestos cloth to prevent air leakage.

Now for the power plant. This consists of a quarter, sixth, or eighth horse motor mounted in the position illustrated on the opposite page. It should be provided with as firm a base as possible, but any good electrician knows that. The two pulleys on the motor and the fan blade respectively have a ratio of approximately 1 to 4. You may have to vary this by experimentation.

See that the hole through which the motor pulley passes is as small and as air-tight as possible. Current consumption of the motor is small, so that there will be no substantial addition to your electric bill each month.

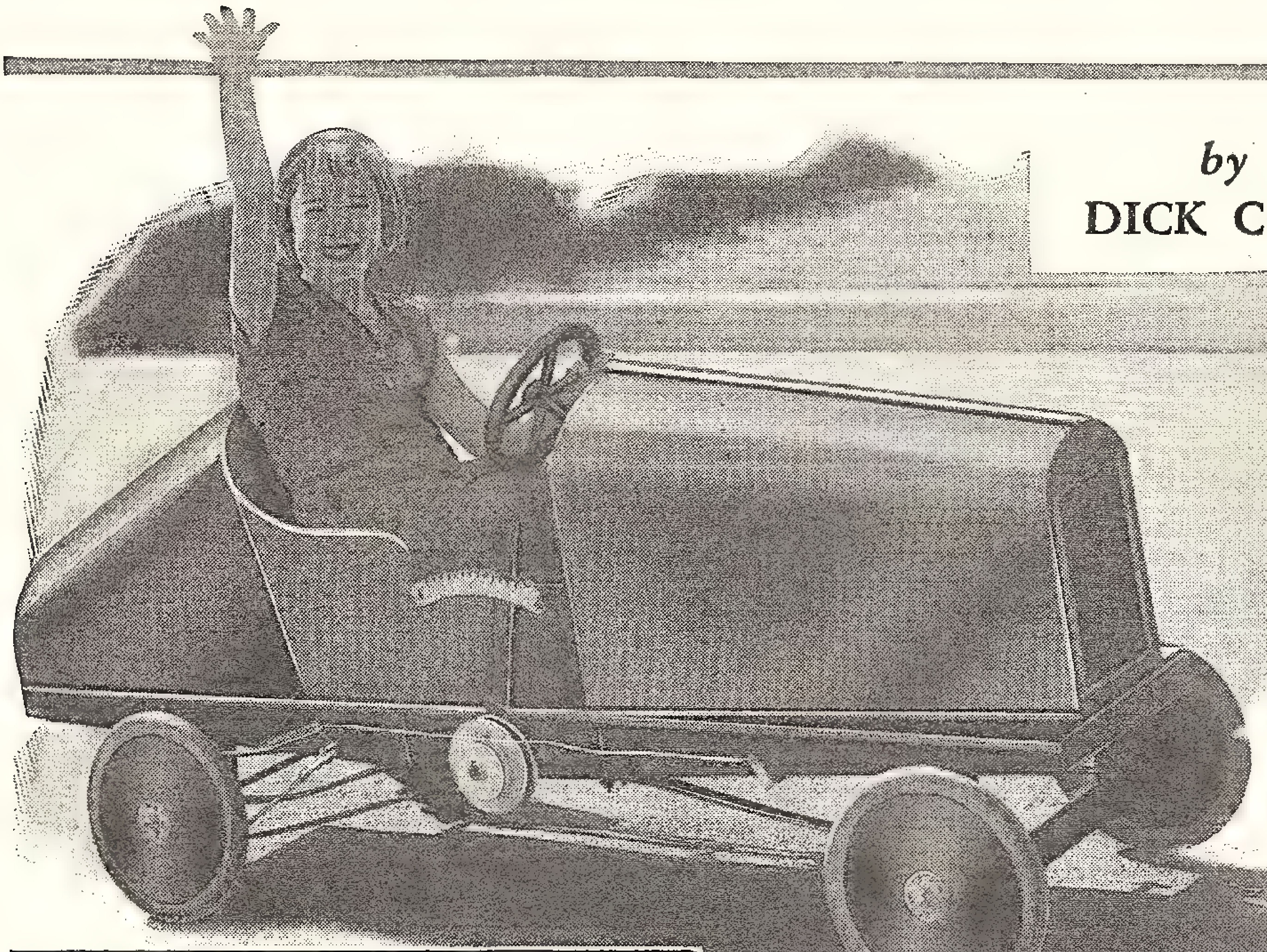
Simple Cure for Leaky Valves

Some radiator valves have an irritating way of dripping, dripping, dripping, with the result that a good carpet is sometimes ruined. Remedy this nuisance by covering the valve with a sponge which has been hollowed out to fit over the metal. The water then soaks into the sponge and evaporates, acting as a humidifier.



Rubber Bands DRIVE This

by
DICK COLE



The completed rubber band powered motor ready for a three-mile spin—from a single winding of the rubber band "motor." Headlights, horn, etc., add to attractiveness of car.

Here's something distinctly new in the way of midget autos. Powered by a battery of rubber bands from old inner tubes, it will cover a distance of three miles at a surprising clip—and on one winding. Seated at the wheel you'll be the envy of all the youngsters in town.

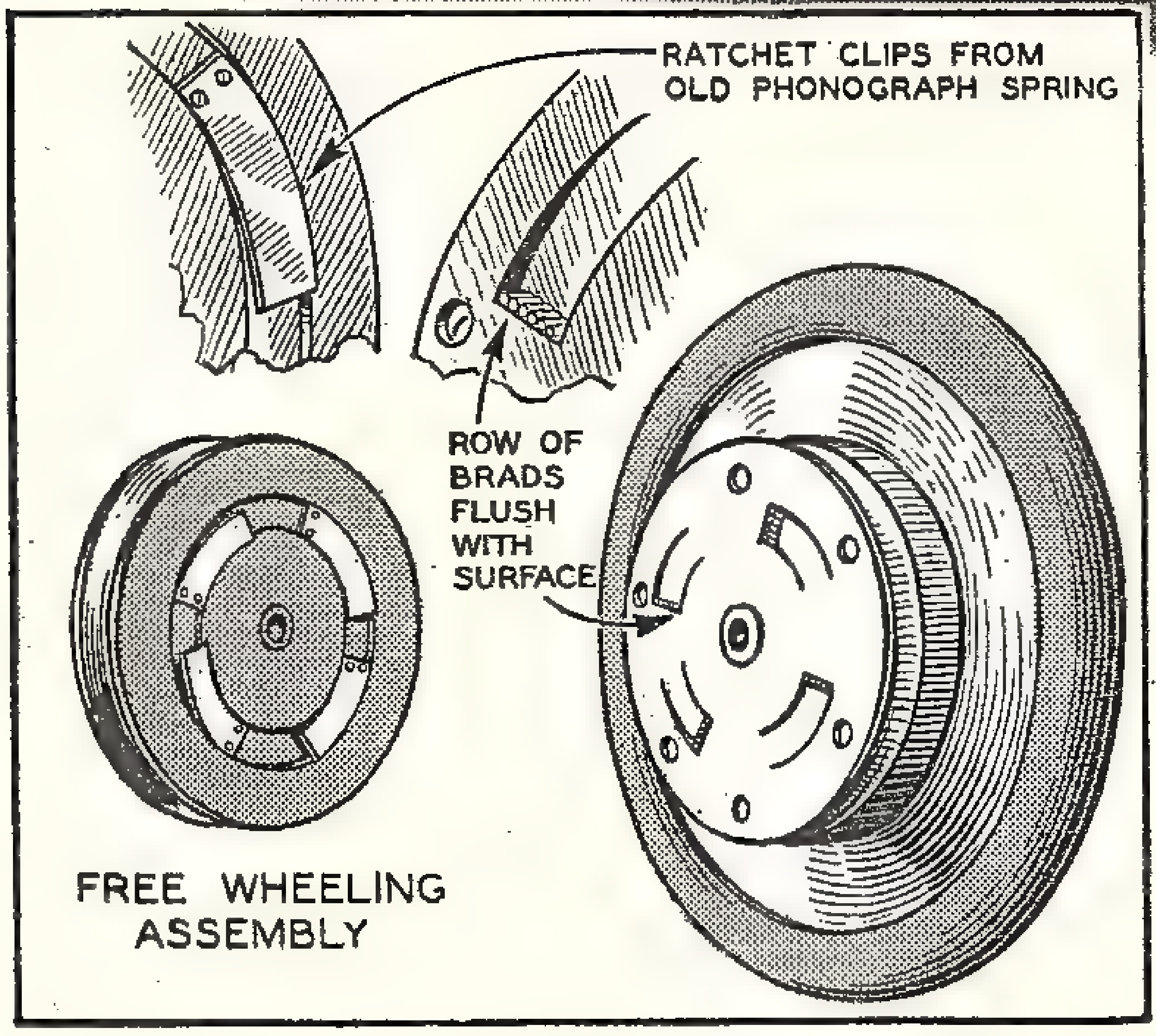

RATCHET CLIPS FROM OLD PHONOGRAPH SPRING
ROW OF BRADS FLUSH WITH SURFACE
FREE WHEELING ASSEMBLY

Fig. 1. Here's how the free wheeling system on the rubber band "motor" works. Note that the ratchet clips engage the notches in the wheel. Most of run is spent free wheeling.

Be there the boy with soul so dead,
Who to himself has never said:
"Gee, I wish I had a baby auto."

THIS article will make those wishes come true. Here is a nifty looking baby with clutch, two forward speeds and reverse, and *Free Wheeling.* The design is simple; the materials are cheap; which brings the building of this miniature car within the scope of the average mechanically minded boy's pocket book.

It is powered with rubber band motors! Now don't let skepticism enter your mind until you have listened to reason.

To show the reader how much power can be stored up in the rubber band "motor" of the baby car, I shall illustrate. Suppose you looped three, heavy-duty, 6" inner tubes of good, live rubber over a solid post, and looped the other ends around the bumper of a light car. Now start the car. The tubes will stretch out about five times their original length and will actually stall the car *in low gear.*

Now think of the potential energy possessed by those stretched tubes! Think how high they could hurl a rock if made into a giant catapult!

That is the potential power stored in the rubber band motor—only more. When the

Midget Auto Three Miles

amount of rubber contained in three inner tubes is cut into narrow strips, the rubber has a greater elastic limit. The purpose of the rubber band motor is to conserve all the available power and deliver it to the wheels of the car in an even flow.

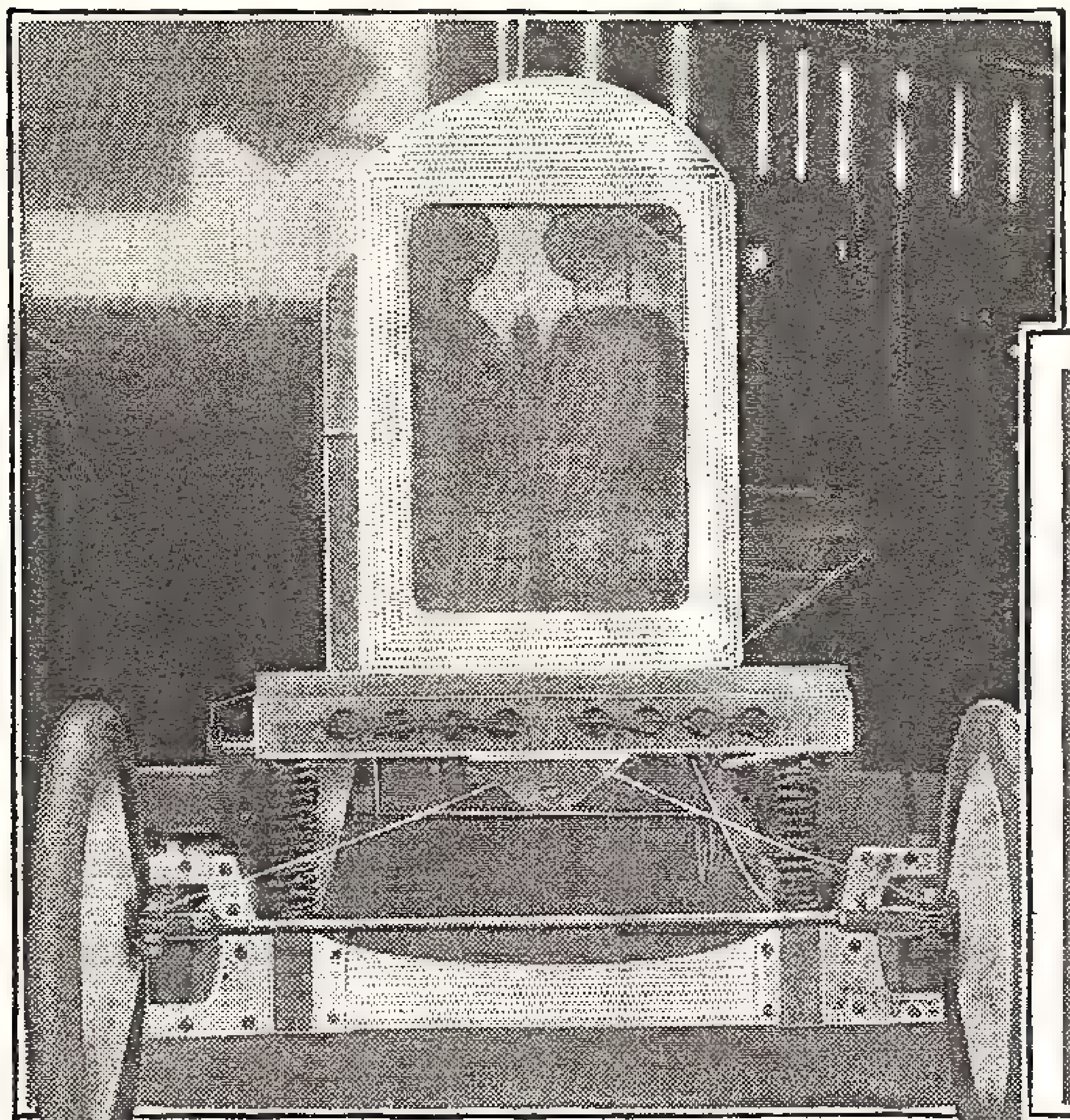
The plan and side view in Figs. 9 and 8 respectively, are not offered to familiarize the builder with the general working principles of the baby car. Here we see the sixteen rubber band motors which contribute their twisting torque through a train of small gears to a common master gear. This, in turn, operates the pinion gear shaft which communicates the power to a cross-shaft, thence by belt drive to the wheels.

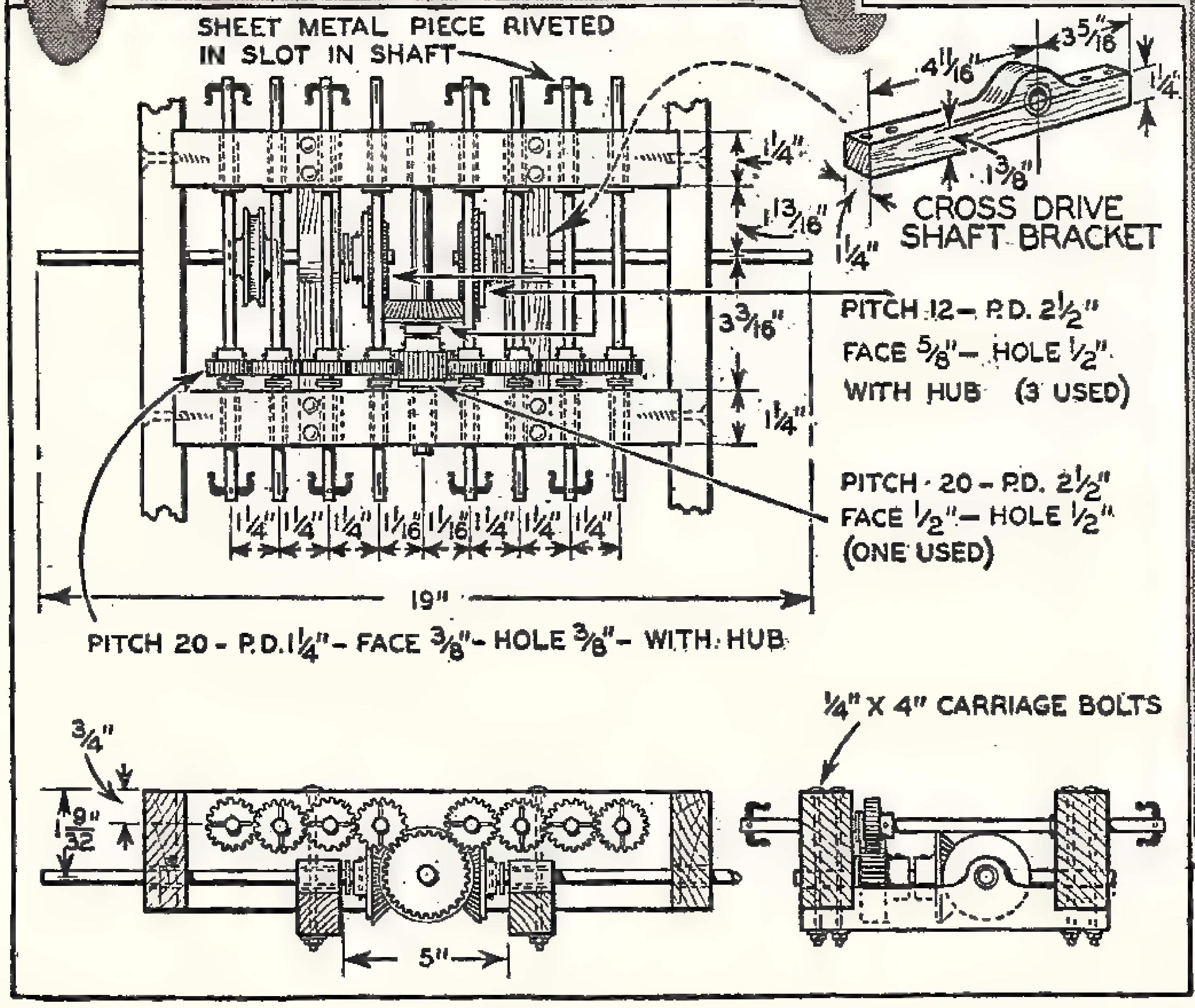
The forward drive is through the right rear wheel only, and two round leather belts running over V pulleys of different sizes provide two speed ratios. Normally the belts are free on the pulleys, but an idler pulley can be brought to bear against either belt. The contact surface of the V pulleys is highly polished so that very little friction is contributed by the slack belt.

The driven pulley floats freely on the back axle, and is fitted with a simple side ratchet device which engages the wheel itself. This provides free wheeling when the rubber band motor is stopped.

This is done by pressing the left pedal. This action snubs a turn of sash-cord in a grooved pulley on the cross drive-shaft. See Fig. 9. Brakes are provided by passing a loop of sash-cord around a grooved pulley bolted to the side of each wheel, and leading the cord to the right pedal.

Each rubber band unit of the motor passes through a hole in the end cross rail




SHEET METAL PIECE RIVETED IN SLOT IN SHAFT
1¼"
1 13/16"
1¼"
3 3/16"
1¼"
1¼" 1¼" 1¼" 1 1/16" 1 1/16" 1¼" 1¼" 1¼"
19"
4 11/16"
3 5/16"
1¼"
1⅜"
CROSS DRIVE SHAFT BRACKET
PITCH 12 – P.D. 2½" FACE ⅝" – HOLE ½" WITH HUB (3 USED)
PITCH 20 – P.D. 2½" FACE ½" – HOLE ½" (ONE USED)
PITCH 20 – P.D. 1¼" – FACE ⅜" – HOLE ⅜" – WITH HUB
¾"
9/32"
5"
¼" X 4" CARRIAGE BOLTS

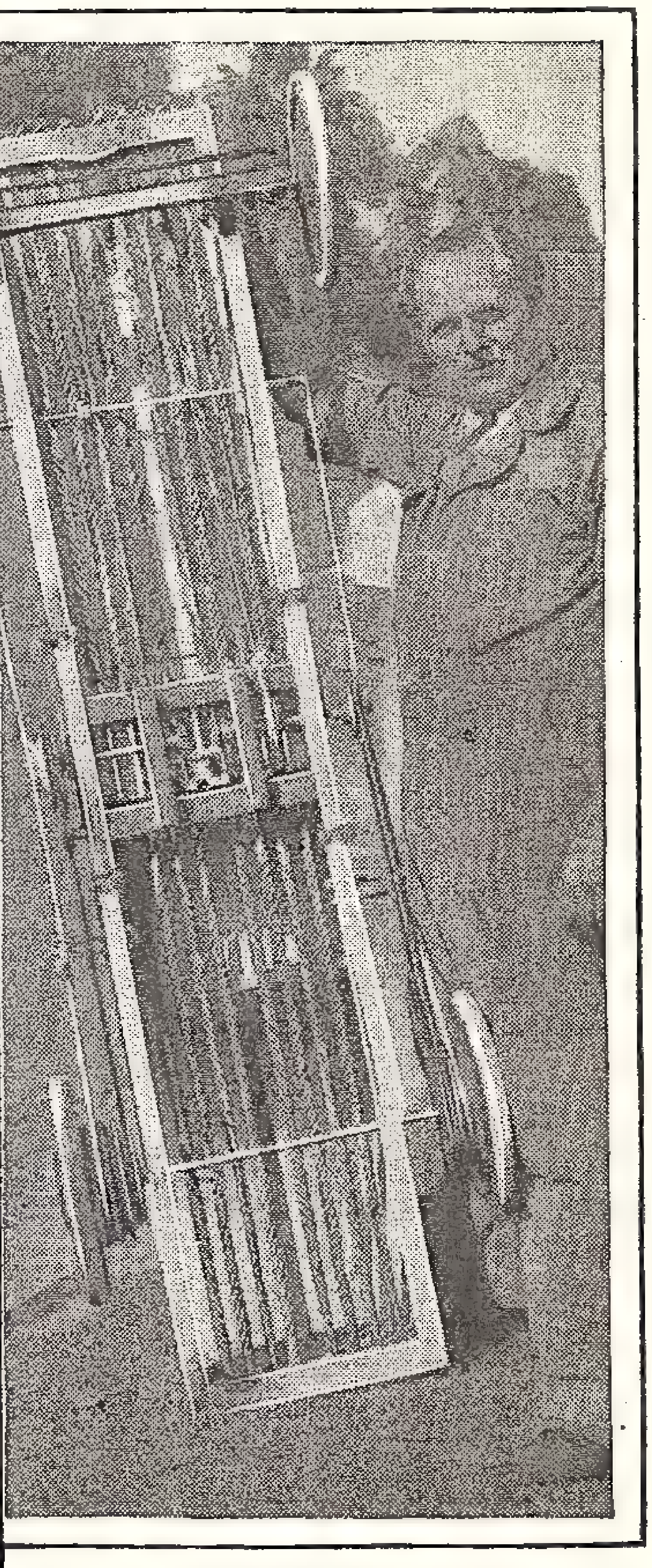


Fig. 2. (Above) Underside view of chassis shows "motor" wound up ready to deliver its power to the gears. Motor assembly, seen in Fig. 3 at left, is built between two cross members at center section of frame. Power is delivered from the rubber bands to the wheels through the Boston stock gears. Front view of the car is seen at top left.

Frame Must Be Strong to Stand Twisting Torque of Rubber Band Motor

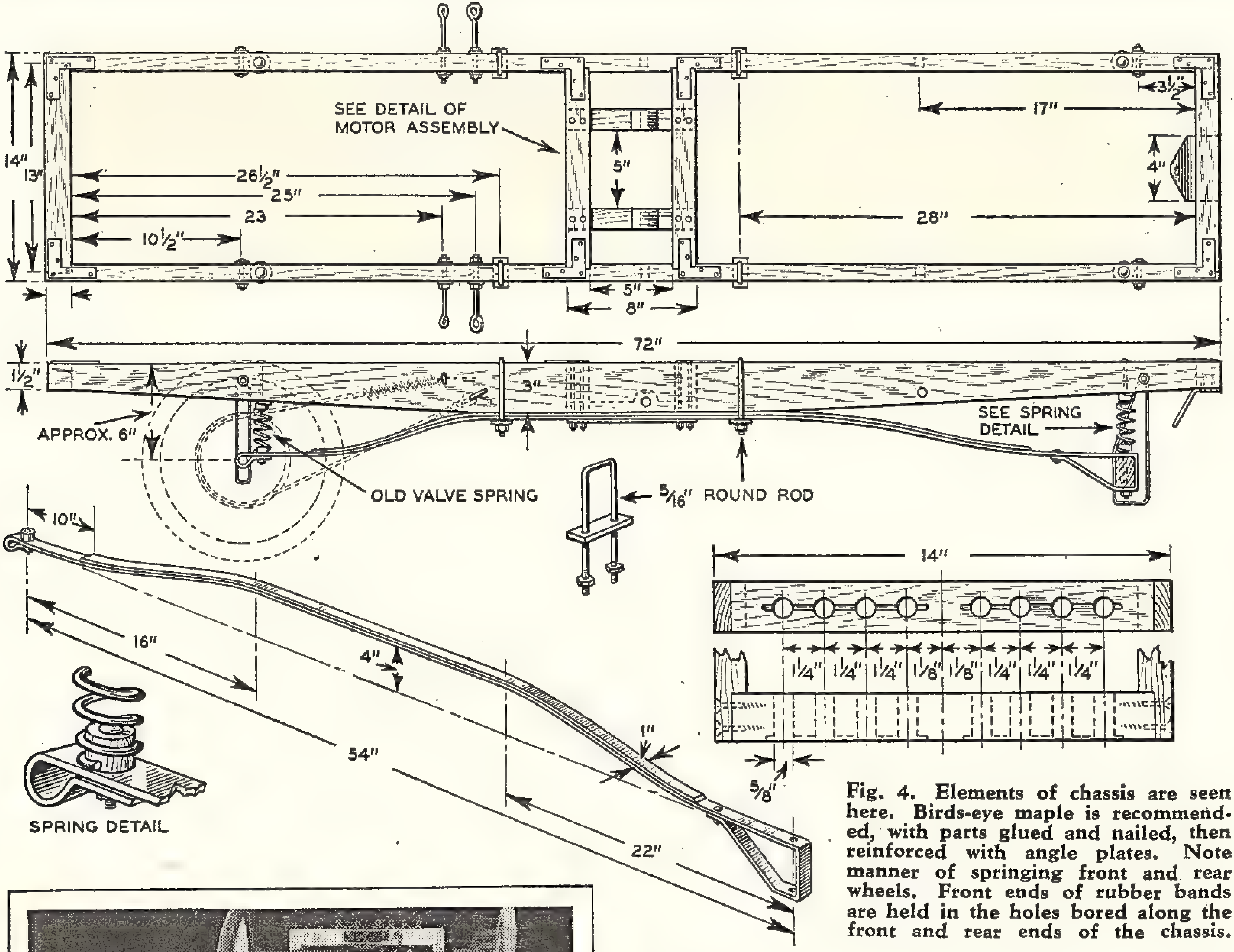


Fig. 4. Elements of chassis are seen here. Birds-eye maple is recommended, with parts glued and nailed, then reinforced with angle plates. Note manner of springing front and rear wheels. Front ends of rubber bands are held in the holes bored along the front and rear ends of the chassis.

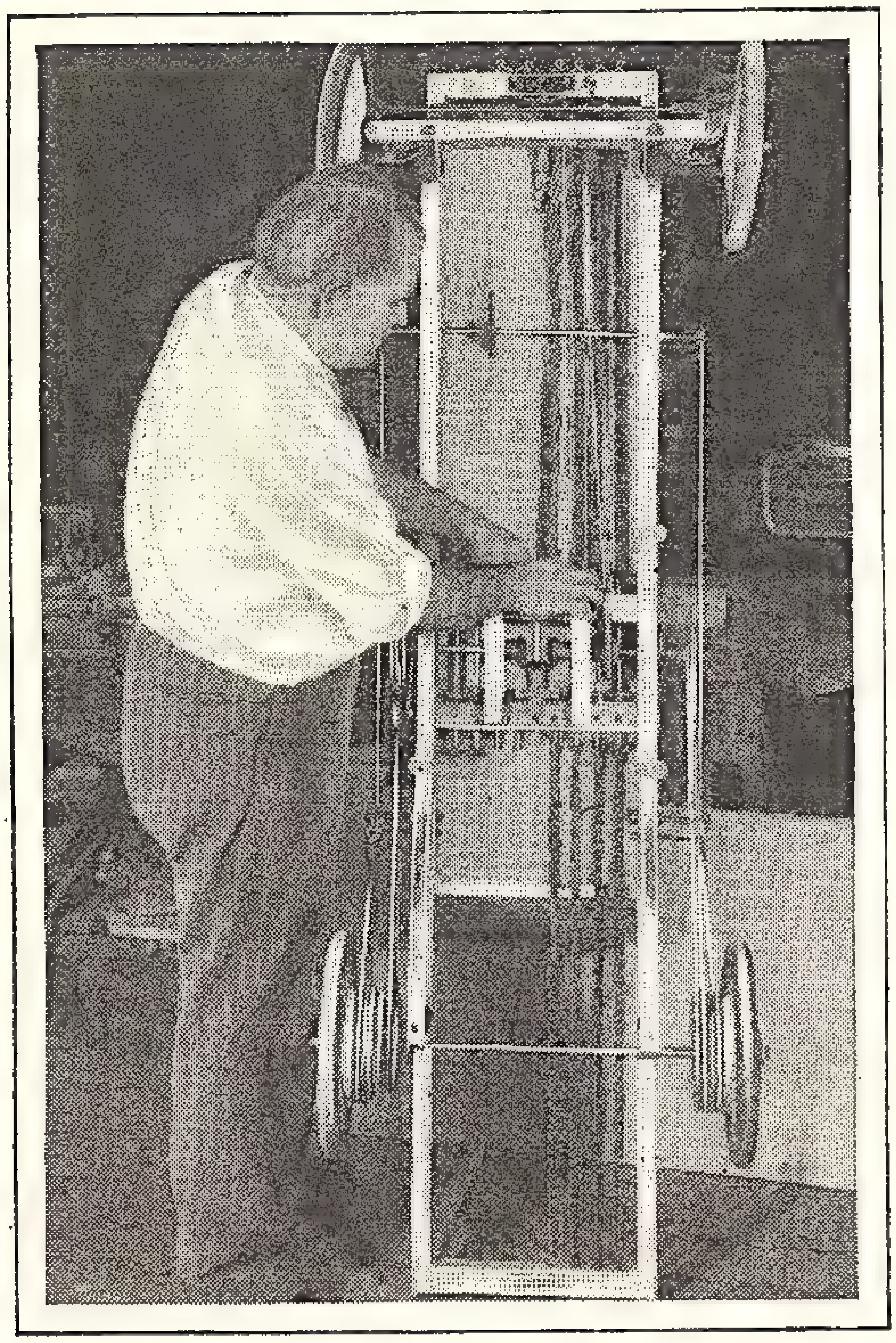


Fig. 5. You can get a clear idea as to how the rubber bands are secured to the frame from this photo. Observe also pulleys on rear wheels for braking and transmission.

of the frame and is fastened to a special clip (Fig. 10). This permits the bands to be stretched while winding, which adds greatly to the capacity of the motor.

Fig. 4 shows the frame of the baby auto. Let it be understood that this must be strong and rigid to resist the twisting torque and pull of the sixteen rubber band motor. It is well to tightly mortise, glue and screw all joints, and, as an extra precaution, cap the joints with angle plates. The middle rails support the transmission unit of the motor, but this is covered in a special detail (Fig. 3).

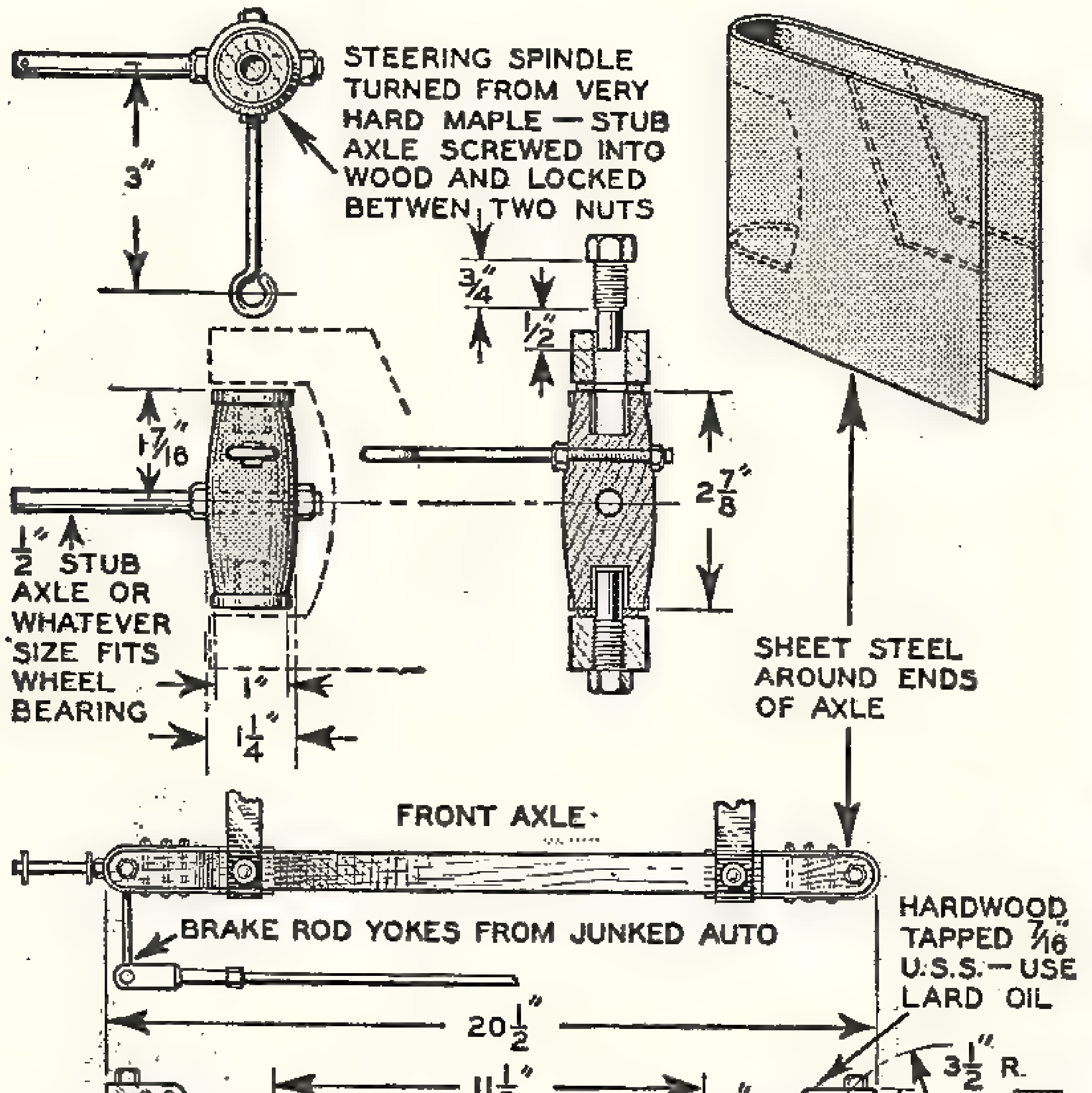
Front Axle

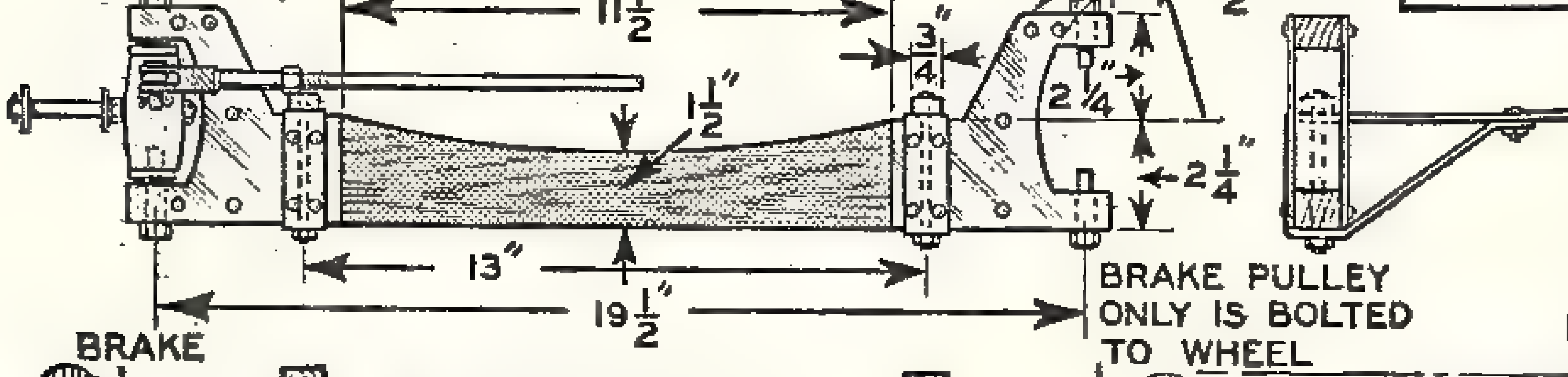
Fig. 6 covers all the details of the front axle and the steering spindles. Carefully selected wood should be used, and an especially hard, knotty piece for the steering spindles. Birds-eye maple is recommended.

The sheet metal plates around the ends of the axle should be secured in place before cutting the notch to receive the steering spindle (See Fig. 6). The cutting can be done on a jig-saw with a metal cutting blade. The size of the wheel axles depends upon the size of the hole in the wheels used.

An old brake-rod with yokes, from an auto wrecking yard, will provide the tie-rods in conjunction with arms made of 5/16" eyebolts. The steering wheel hook-up is shown in a later detail. The spring suspension method of the front axle is better understood by consulting Fig. 4.

Power Is Delivered to Rear Wheels Through Belts Over Idler Pulleys


STEERING SPINDLE TURNED FROM VERY HARD MAPLE — STUB AXLE SCREWED INTO WOOD AND LOCKED BETWEN TWO NUTS
3"
3/4"
1/2"
1 7/16
2 7/8"
1/2" STUB AXLE OR WHATEVER SIZE FITS WHEEL BEARING
1"
1 1/4"
SHEET STEEL AROUND ENDS OF AXLE
FRONT AXLE
BRAKE ROD YOKES FROM JUNKED AUTO
HARDWOOD TAPPED 7/16 U.S.S.—USE LARD OIL
20 1/2"


11 1/2"
3/4"
3 1/2" R.
1 1/2"
2 1/4"
2 1/4"
13"
19 1/2"
BRAKE PULLEY ONLY IS BOLTED TO WHEEL

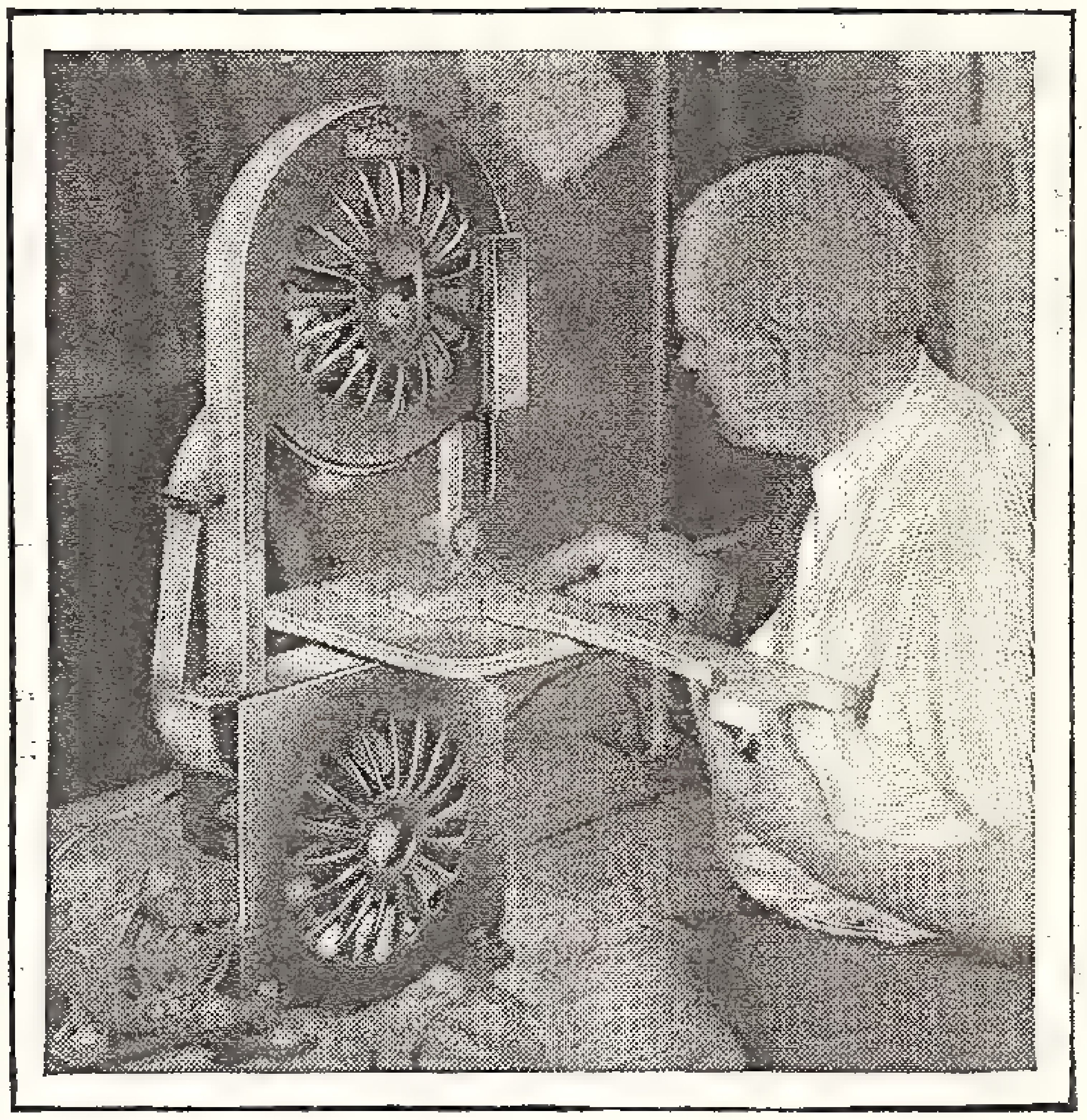
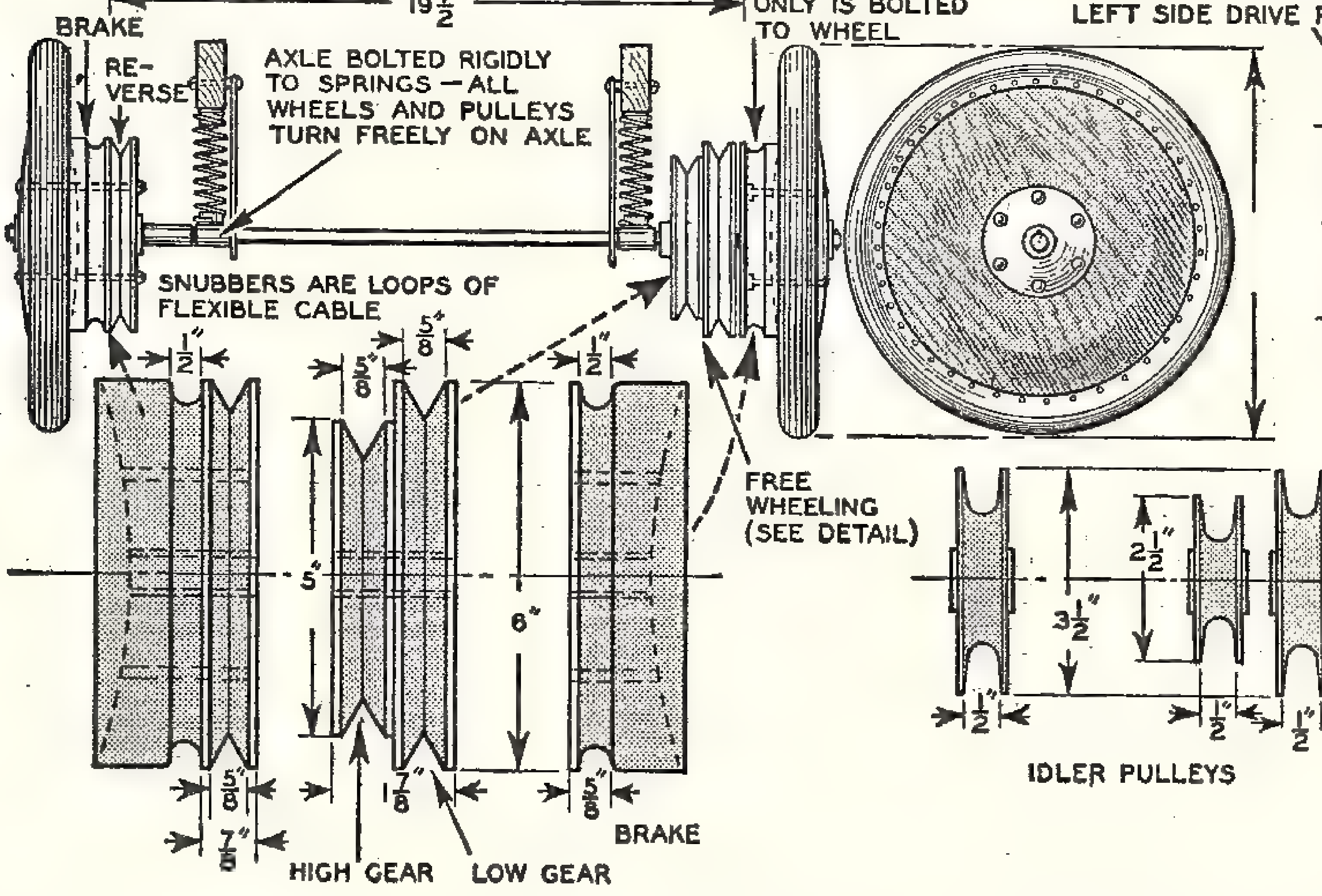


Fig. 7. You will find it easy to cut out the front axle on the auto with a band-saw. The ends are strengthened with sheet steel which also serves to hold the steering spindle as illustrated in the drawings at left.


BRAKE
RE-VERSE
AXLE BOLTED RIGIDLY TO SPRINGS — ALL WHEELS AND PULLEYS TURN FREELY ON AXLE
SNUBBERS ARE LOOPS OF FLEXIBLE CABLE
1/2"
5/8"
1/2"
5"
6"
FREE WHEELING (SEE DETAIL)
5/8"
7/8"
1 7/8"
5/8"
BRAKE
HIGH GEAR
LOW GEAR
3 1/2"
2 1/2"
1/2"
1/2"
1/2"
IDLER PULLEYS

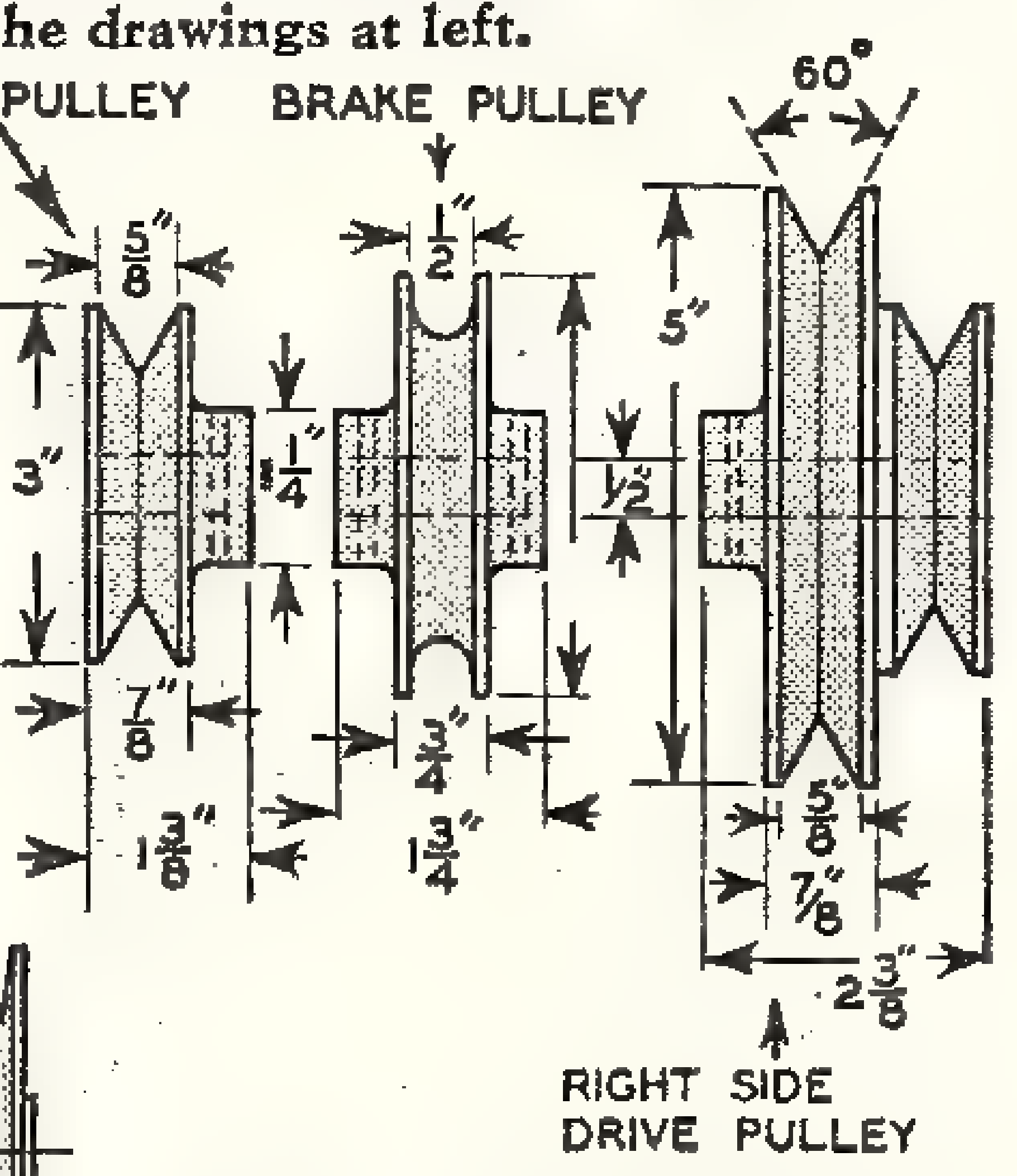

LEFT SIDE DRIVE PULLEY
BRAKE PULLEY
60°
5/8"
1/2"
5"
3"
1 1/4"
1/2"
7/8"
3/4"
1 3/8"
1 3/4"
5/8"
7/8"
2 3/8"
RIGHT SIDE DRIVE PULLEY

Fig. 6. These drawings will give you clear idea as to the construction of the front wheels. You will see that some of the pulleys are grooved V-shaped, while others are round. Follow the plans carefully. Toy auto wheels should be used.

In Fig. 6 we have the rear axle, drive pulleys, free-wheeling and the spring suspension of the midget car. The notations attached to the drawings should make everything obvious. Here we see how four discarded valve springs add support to the otherwise rather flimsy springs.

The simplicity of the free-wheeling is shown in Fig. 1 and needs no explanation. It is the free wheeling feature which gives the baby auto its wide range of travel. A few impulse turns of the motor, then free-wheel, and so on. By this economical means the car has a travel range of over three miles on one winding of the motor.

The sketch shows 12" rubber-tired coaster wagon or scooter wheels used. These can be obtained from a hardware jobber dealing in toys, etc. They may have to be ordered special and cost about $3.50 a set of four.

In Fig. 3 we have the vital unit of the baby car—the power and transmission assembly. While this may seem rather complicated at first look, it is really very simple. Stock gears are used throughout, and can be bought cheaply from manufacturer's distributors throughout the country. If you have difficulty obtaining the gears, Modern Mechanix will inform you of your nearest agent.

Of course all the holes must be laid out carefully, and, for safety, it is best to allow about .005" more than the regular pitch

Horn, Headlights and Bumper May Be Added to Make Car Business-like

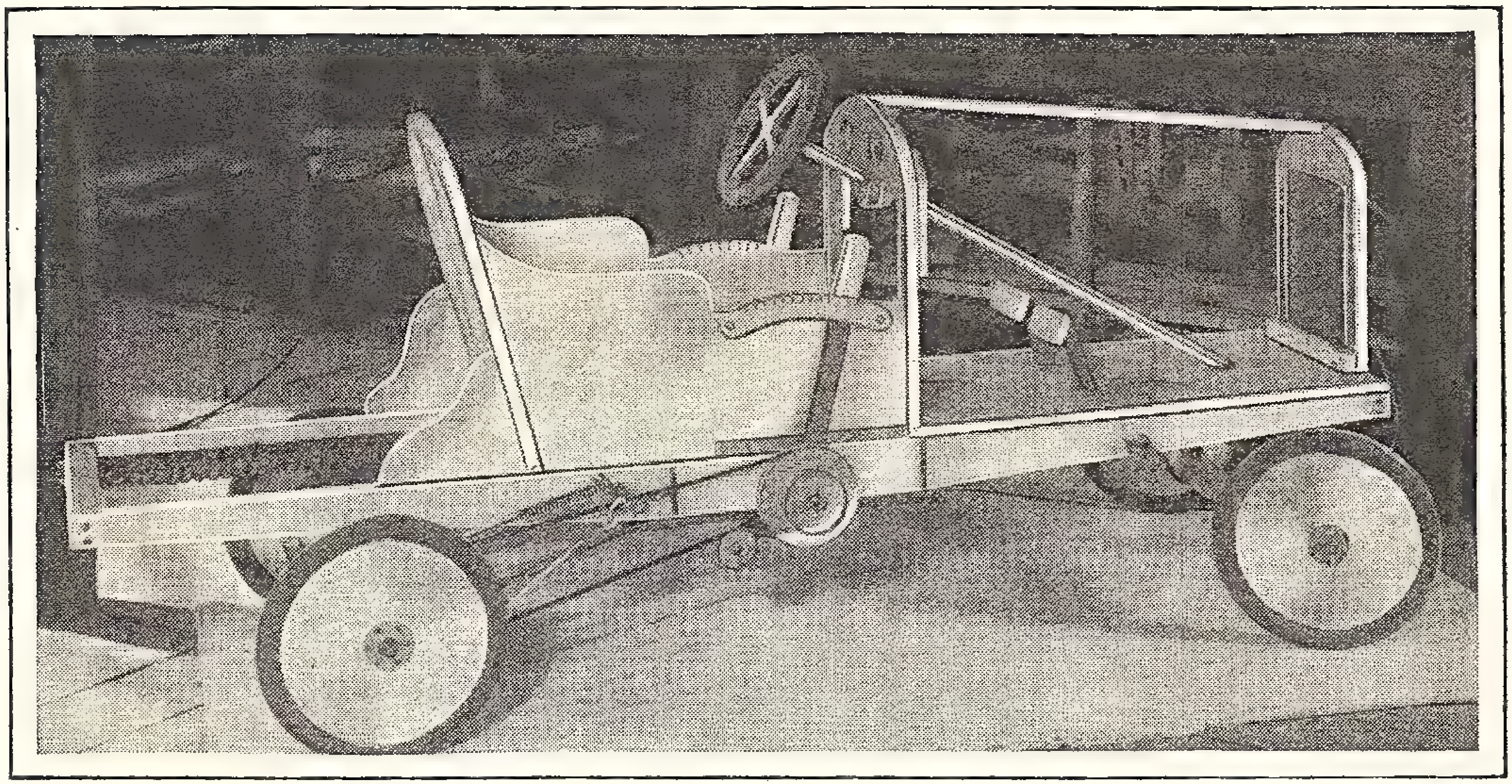


Fig. 8. Ready for covering. Note positions of clutch and brake pedals in front and control lever at side.

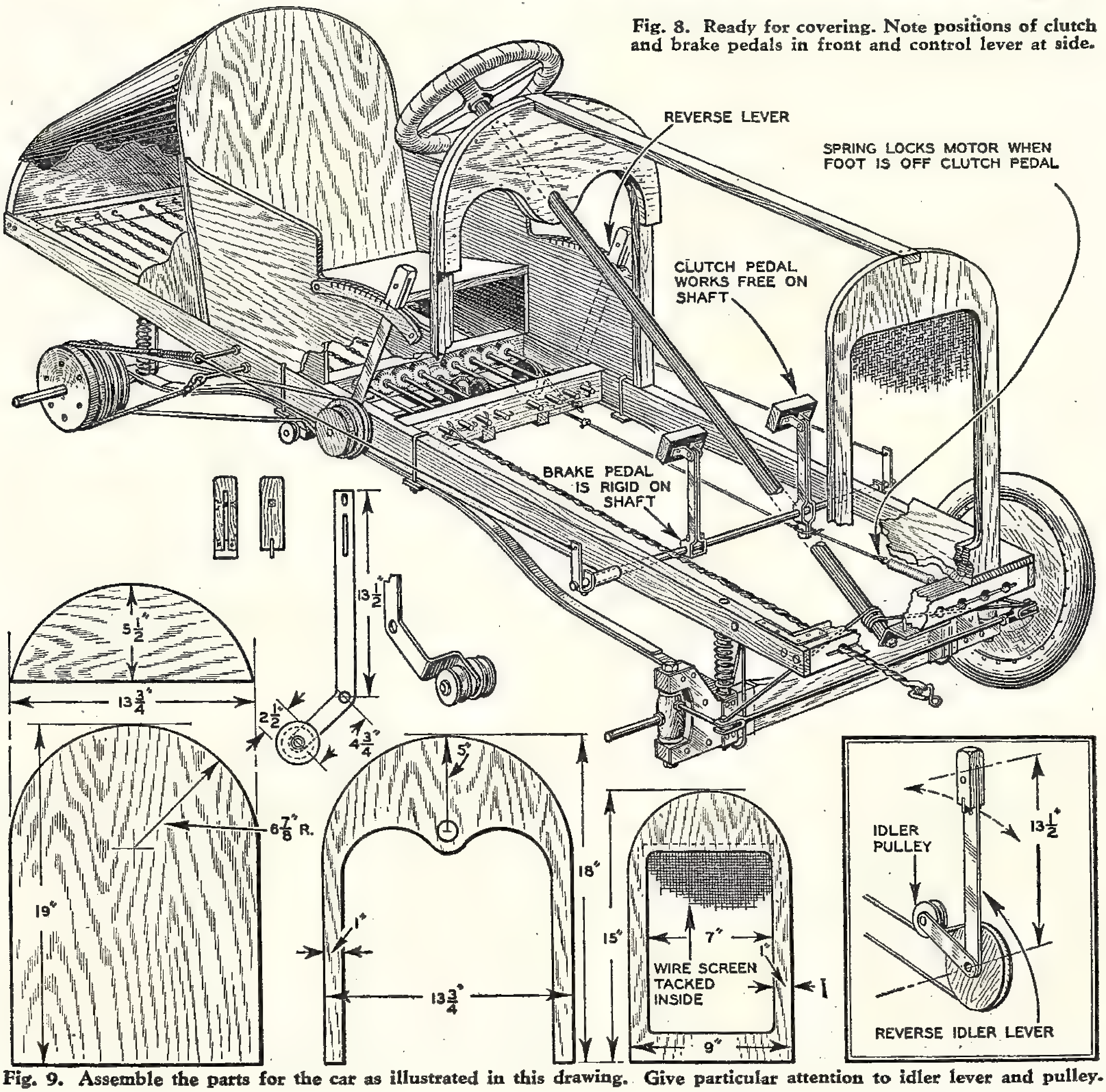

REVERSE LEVER
SPRING LOCKS MOTOR WHEN FOOT IS OFF CLUTCH PEDAL
CLUTCH PEDAL WORKS FREE ON SHAFT
BRAKE PEDAL IS RIGID ON SHAFT
5 1/2"
13 3/4"
13 1/2"
2 1/2"
4 3/4"
5"
6 7/8" R.
19"
18"
1"
13 3/4
15"
7"
1"
WIRE SCREEN TACKED INSIDE
9"
IDLER PULLEY
13 1/2"
REVERSE IDLER LEVER

Fig. 9. Assemble the parts for the car as illustrated in this drawing. Give particular attention to idler lever and pulley.

Sufficient Power May Be Stored in Rubber Bands to Run Car 3 Miles

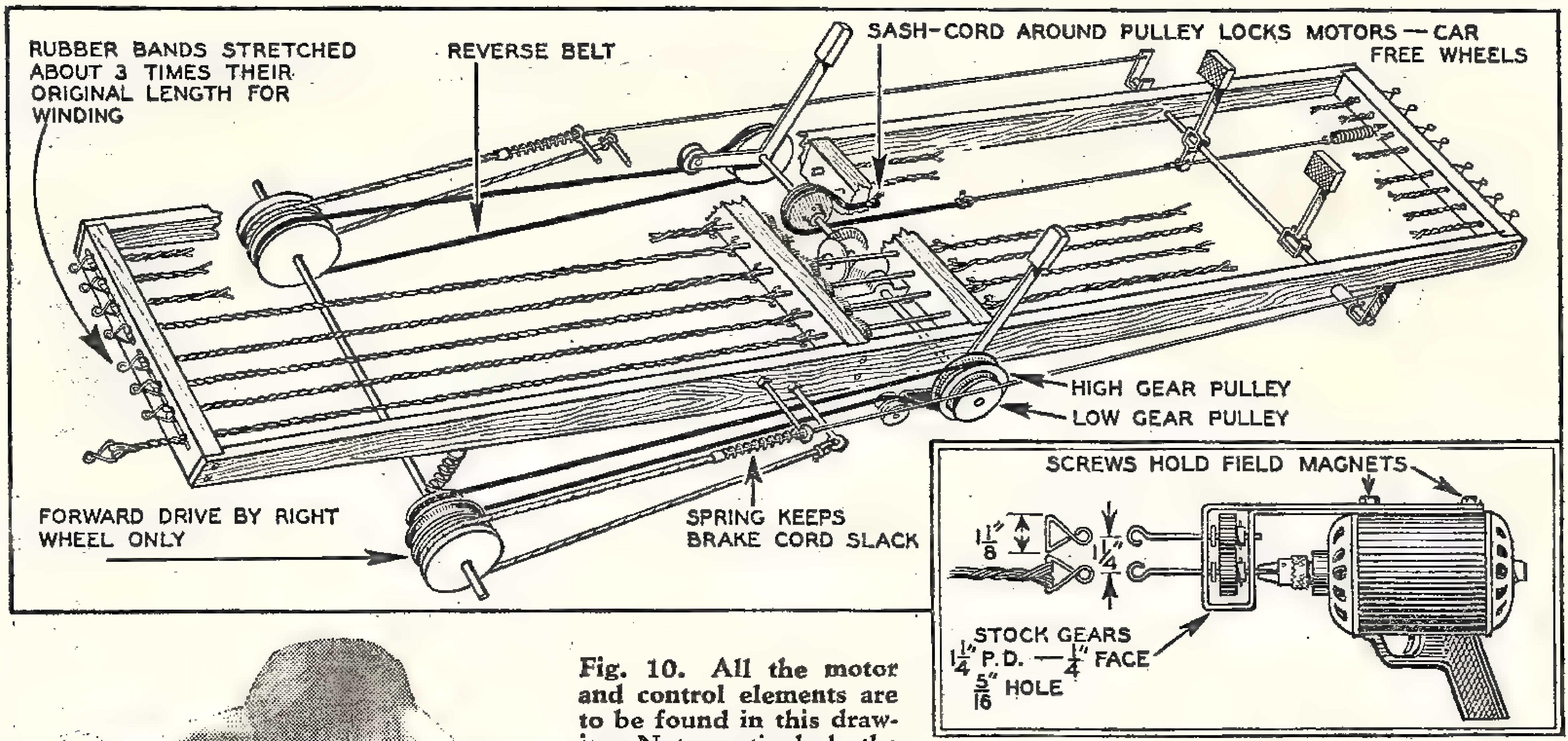
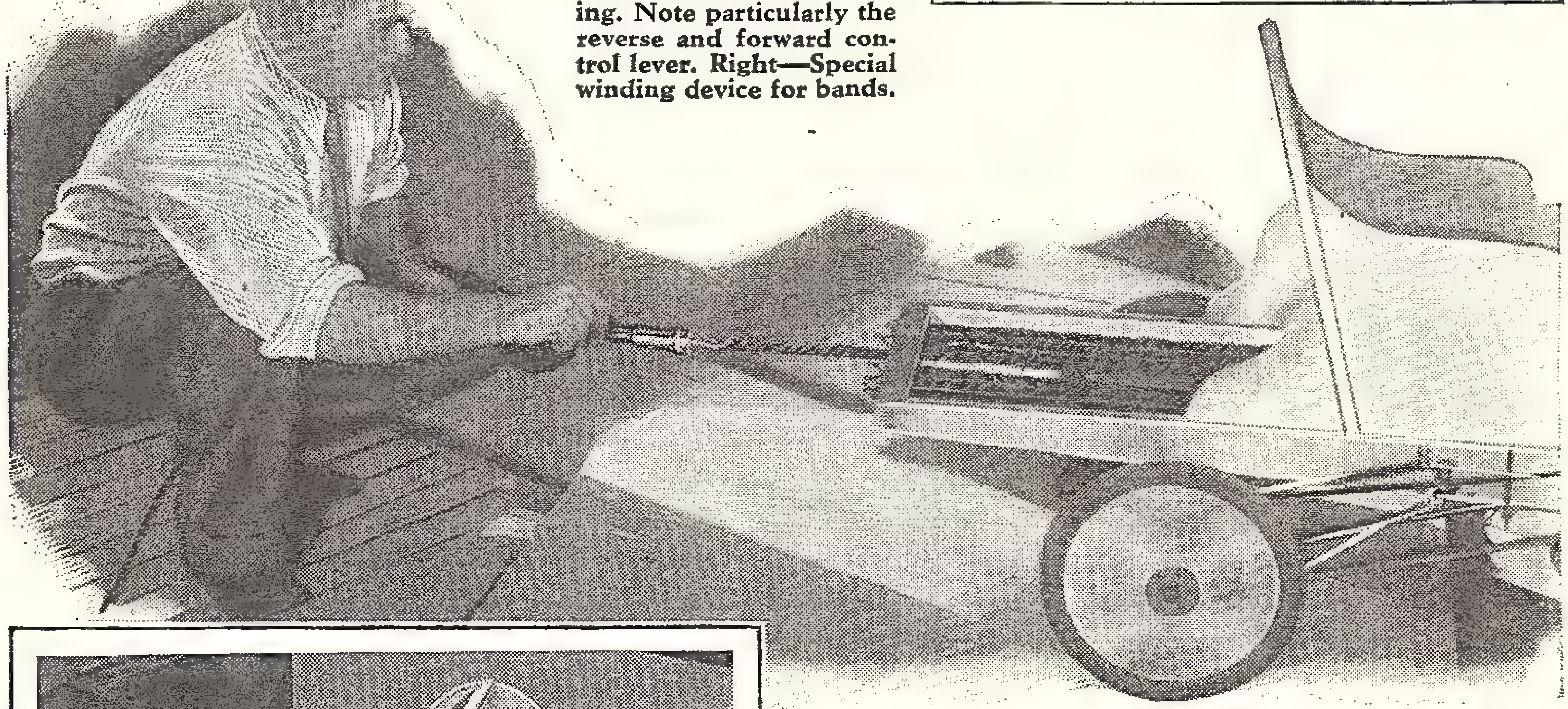
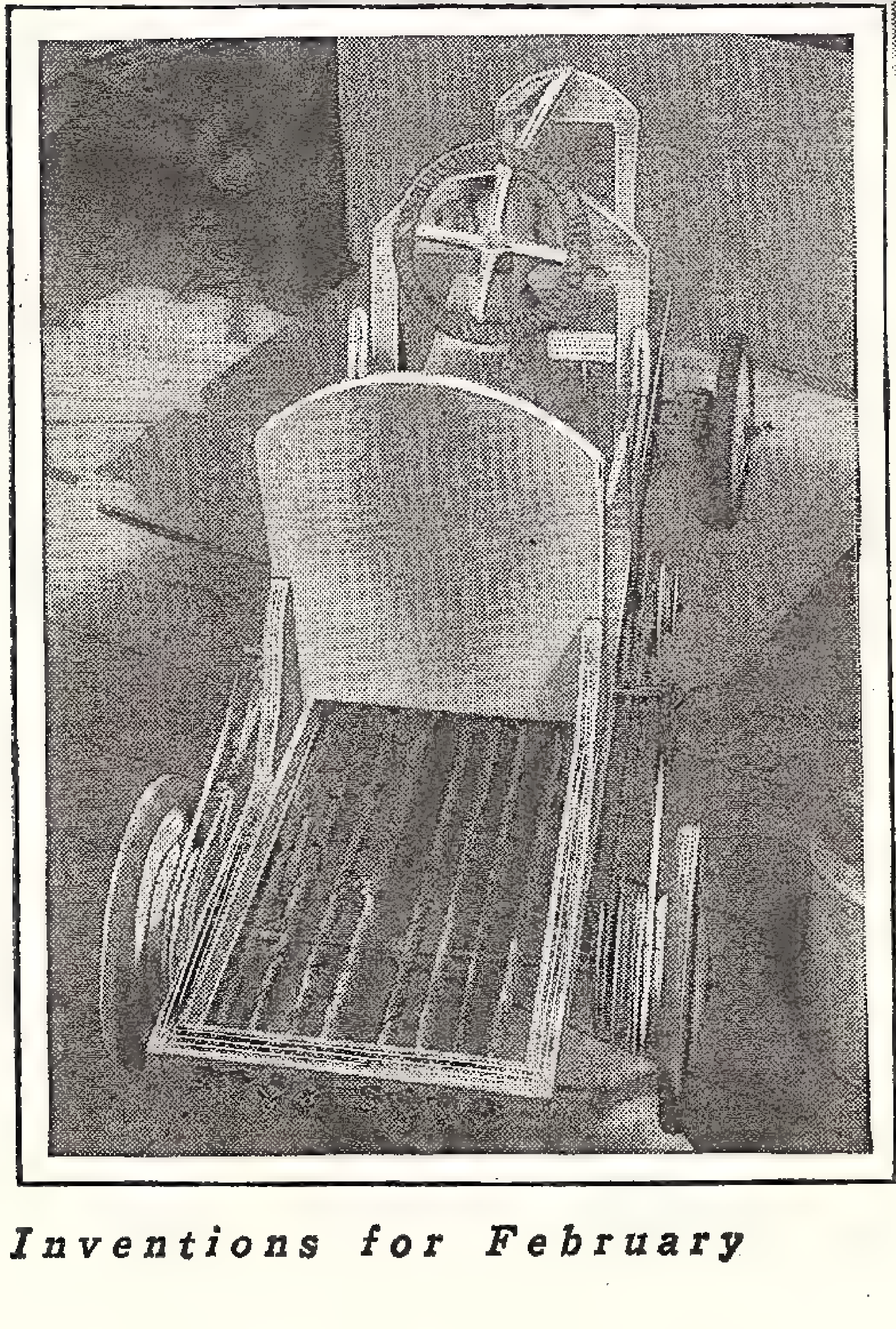

RUBBER BANDS STRETCHED ABOUT 3 TIMES THEIR ORIGINAL LENGTH FOR WINDING
REVERSE BELT
SASH-CORD AROUND PULLEY LOCKS MOTORS — CAR FREE WHEELS
HIGH GEAR PULLEY
LOW GEAR PULLEY
FORWARD DRIVE BY RIGHT WHEEL ONLY
SPRING KEEPS BRAKE CORD SLACK
SCREWS HOLD FIELD MAGNETS
1 1/8"
1/2"
1 1/4"
STOCK GEARS 1 1/4" P.D. — 1/4" FACE 5/16" HOLE

Fig. 10. All the motor and control elements are to be found in this drawing. Note particularly the reverse and forward control lever. Right—Special winding device for bands.



Above—Fig. 11. Wind up "motor" as illustrated here. Special crank disengages the rubber band, twists it, then slips it back into slot. Be sure to wind all bands in same direction.

Left—Fig. 12. Back view gives good idea as to how pulleys are arranged on rear wheels for braking and power transmission. Rubber bands are all wound up for 3-mile spin.



diameter to prevent the possibility of any binding. All the gears are "with hubs," and it is better to pin them to the shafts than to trust to set screws only.

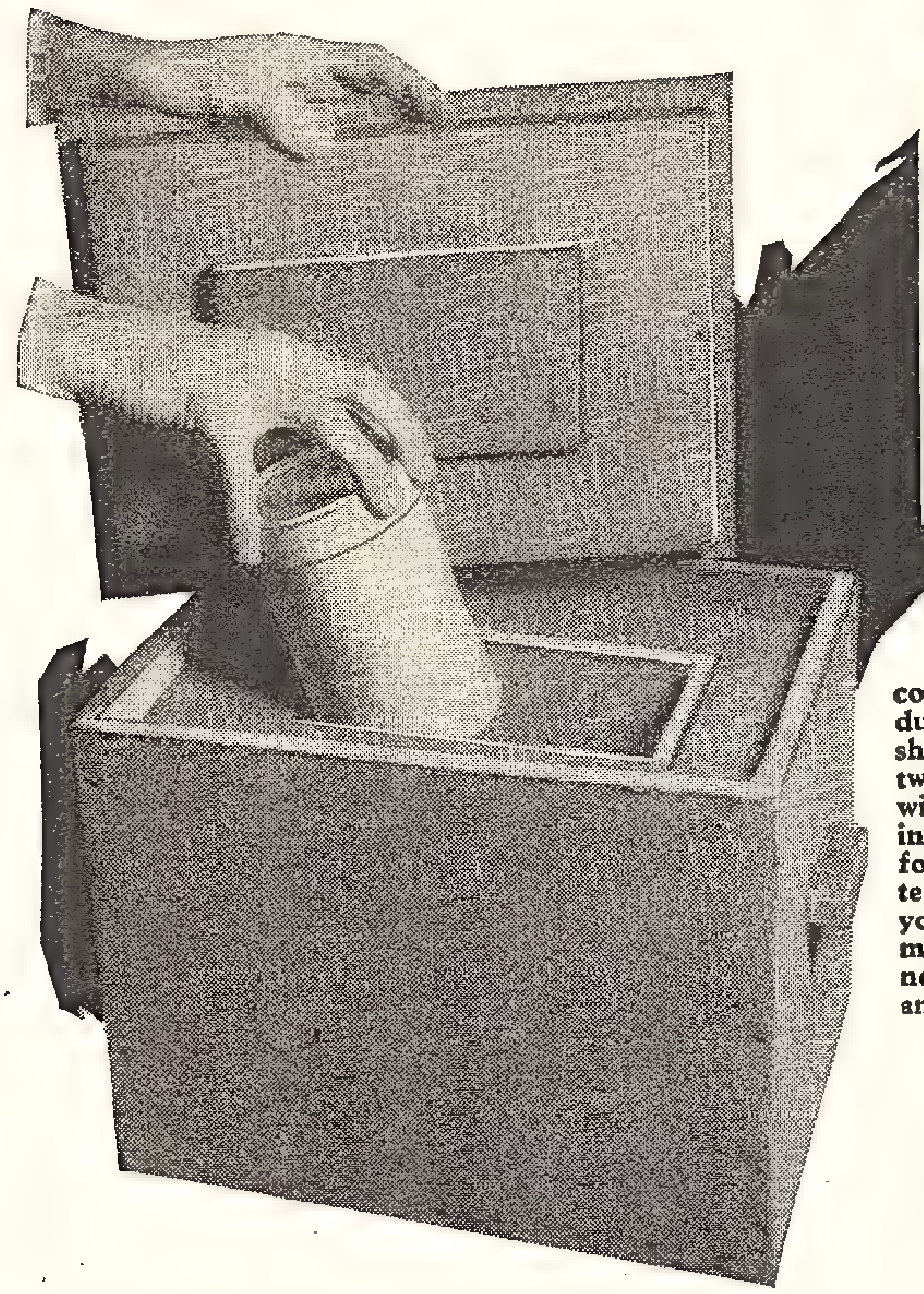
The location of the motor brake pulley—or clutch pulley—is shown. It can readily be understood how a length of sash-cord can be led to the clutch pedal, and how it will snub the pulley when the pedal is depressed.

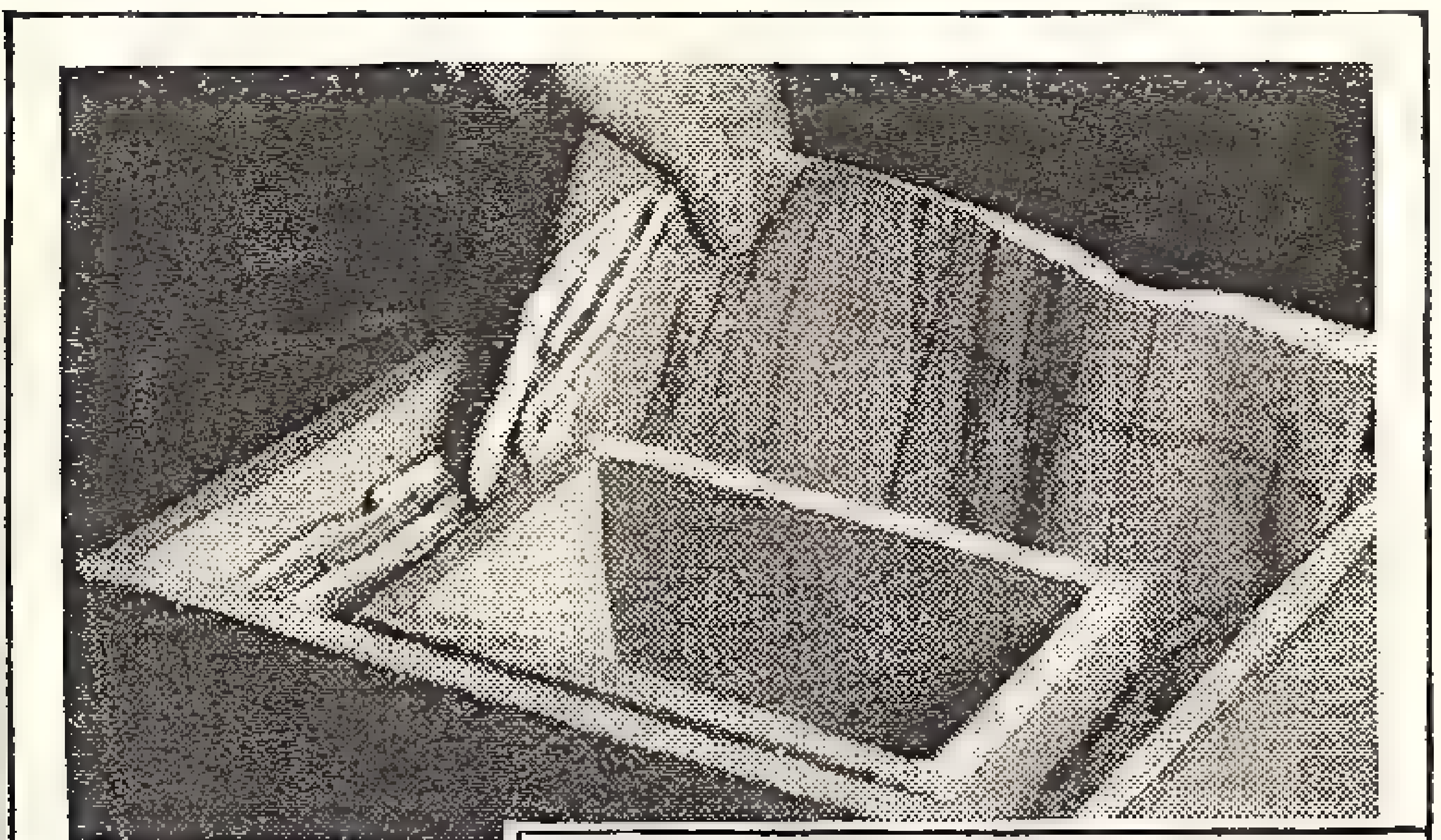
Fig. 9 gives the layout of all the pulleys. Selected white maple will serve for all the pulleys, but it is suggested that fiber or aluminum be used for the idler pulleys. These, of necessity, must be very thin to clear the idle belt.

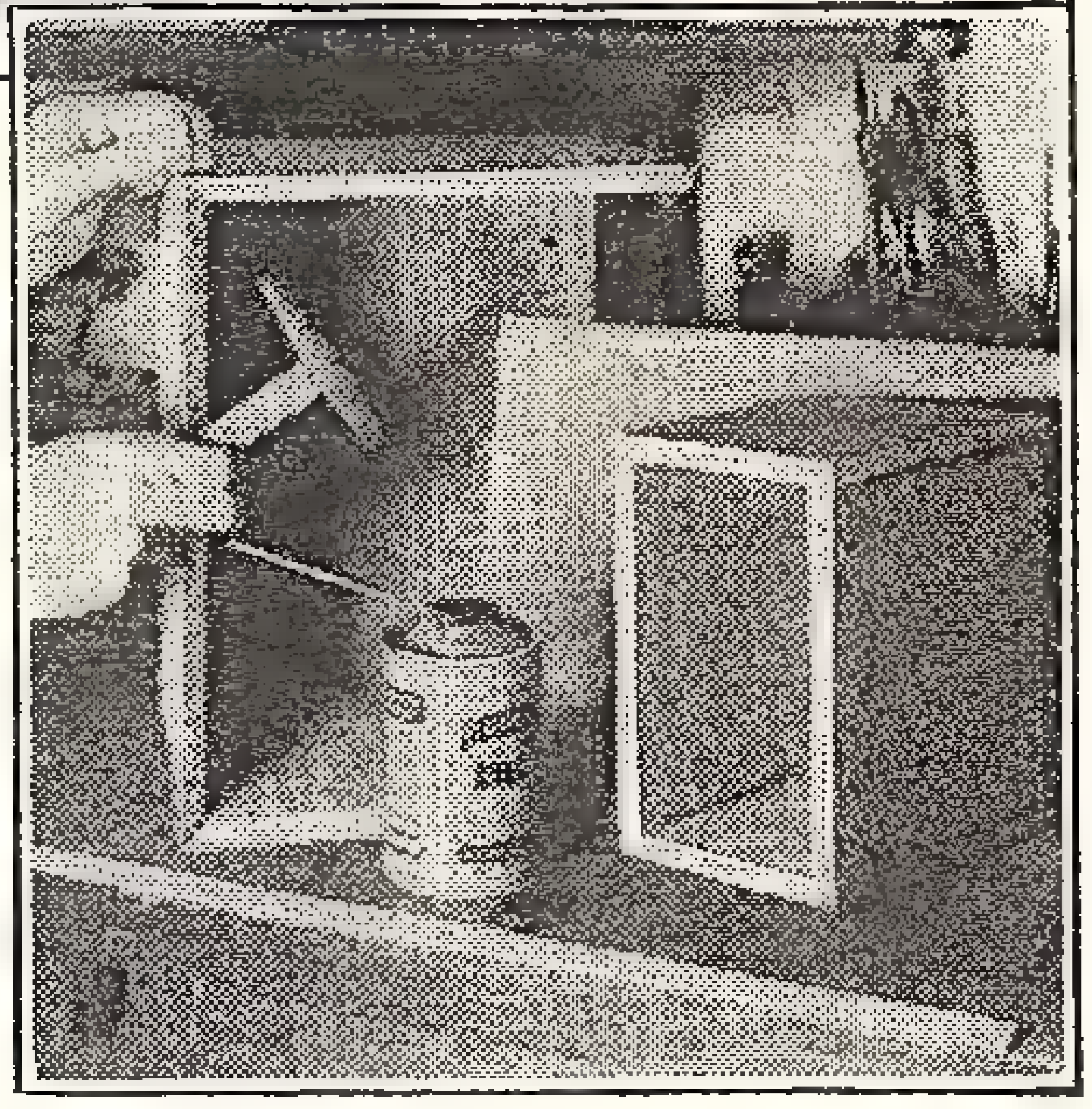
Note that all the drive pulleys are grooved 60 degrees. Round belts are used for transmission, and after a little wear they will assume narrow, flat sides which

(Continued on page 136)

Fireless COOKER, Refrigerator in ONE







At left is seen the completed hot-cold box ready for duty. Photo at top shows how space between boxes is packed with a balsam-wood insulating blanket, for greater heat retentiveness. At right you see illustrated manner in which corners of box are glued and nailed together.

YOU will find many uses for a small box having thick walls of heat-insulating material. It can be used as a storage place for ice cream, a quart remaining in the solid state for several hours: or it can be employed as a fireless cooker by inserting into the insulated chamber a container of partly-cooked food and letting it remain for a few hours.

The box can easily be taken on picnics or camping trips for use as a refrigerator. If a small quantity of dry ice (solid carbon dioxide) is added, the contents will remain frozen all day.

The box illustrated has a chamber measuring about 4x7¼x6½ in. This is large enough to admit a quart of ice cream, whether in the form of a brick or packed in any of the several types of containers. Walls of the box are 2½ in. thick, and are composed of material having a high insulating value.

Balsa Wood Makes Case

One satisfactory type of material to use is balsa wood, familiar to model airplane builders as the lightest wood obtainable. Because of its numerous air cells, this wood also is an excellent heat insulator. Or you can make the box entirely of one of the several insulating wall boards whose name ends in "—tex"; or partly of this material and balsam wool, asbestos or similar insulator.

The latter method was used for the box shown, which was built at a cost of 40 cents. It has 2½ in. walls. An outer shell was constructed of ½ in. insulating board, the corners being formed by glued miter joints.

An inner box was made in a similar manner, except that simple lap joints, held by glue and long finishing nails, were used because appearance was not important. The space between the two shells was packed with pieces of balsam-wool insulating blanket.

Lid Should Fit on Snugly

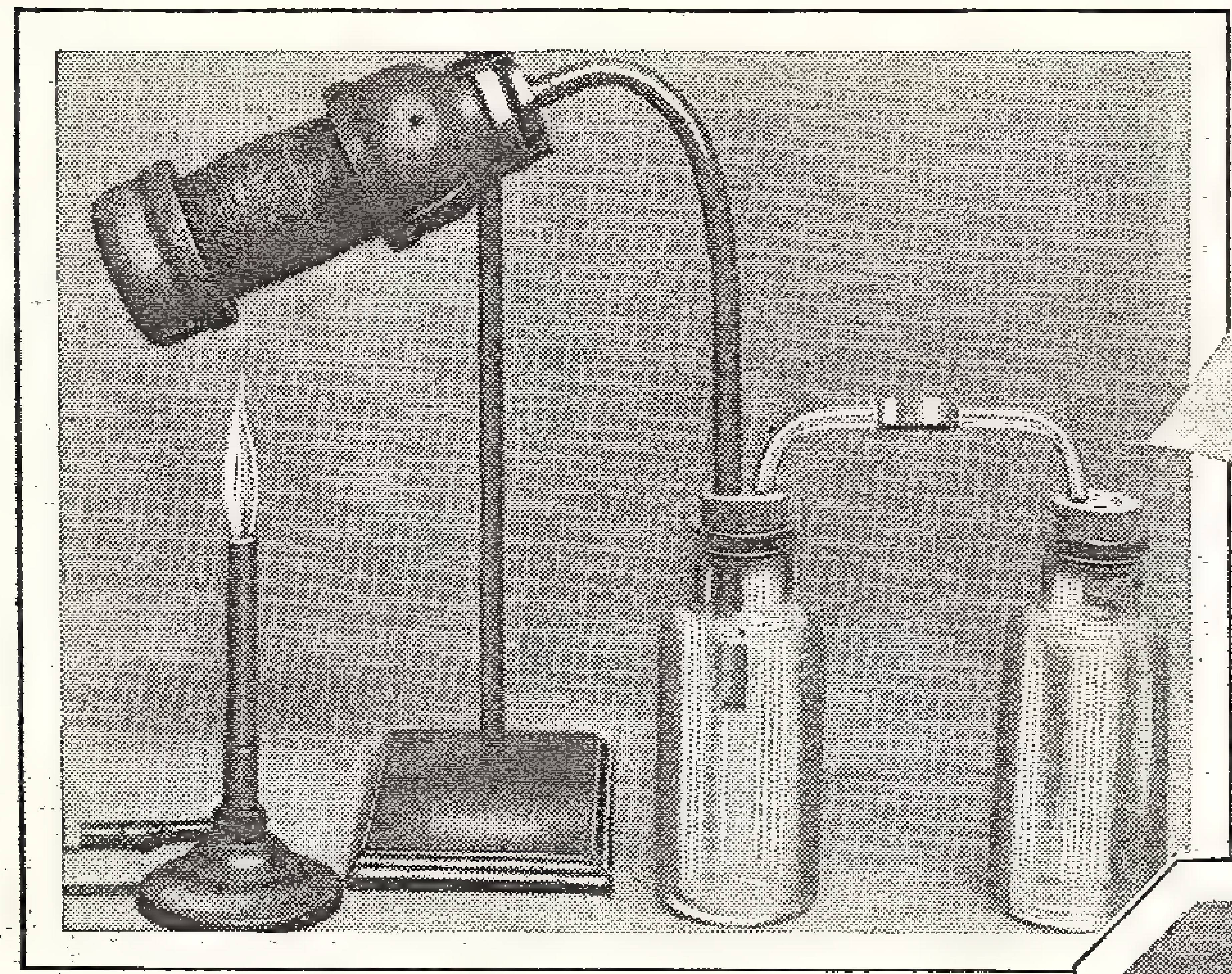
The lid, which is shaped so that part of it fits down into the outer shell and inner chamber, was built up by gluing together four pieces of the insulating board. Edges and inside surfaces were painted with shellac to prevent crumbling. Wood block handles were fastened to the ends.

The outside of such a box can be finished in any manner desired, preferably in a light color to prevent absorption of heat if the box is to be used mostly for preserving frozen materials; or dark if it is to serve more as a fireless cooker.

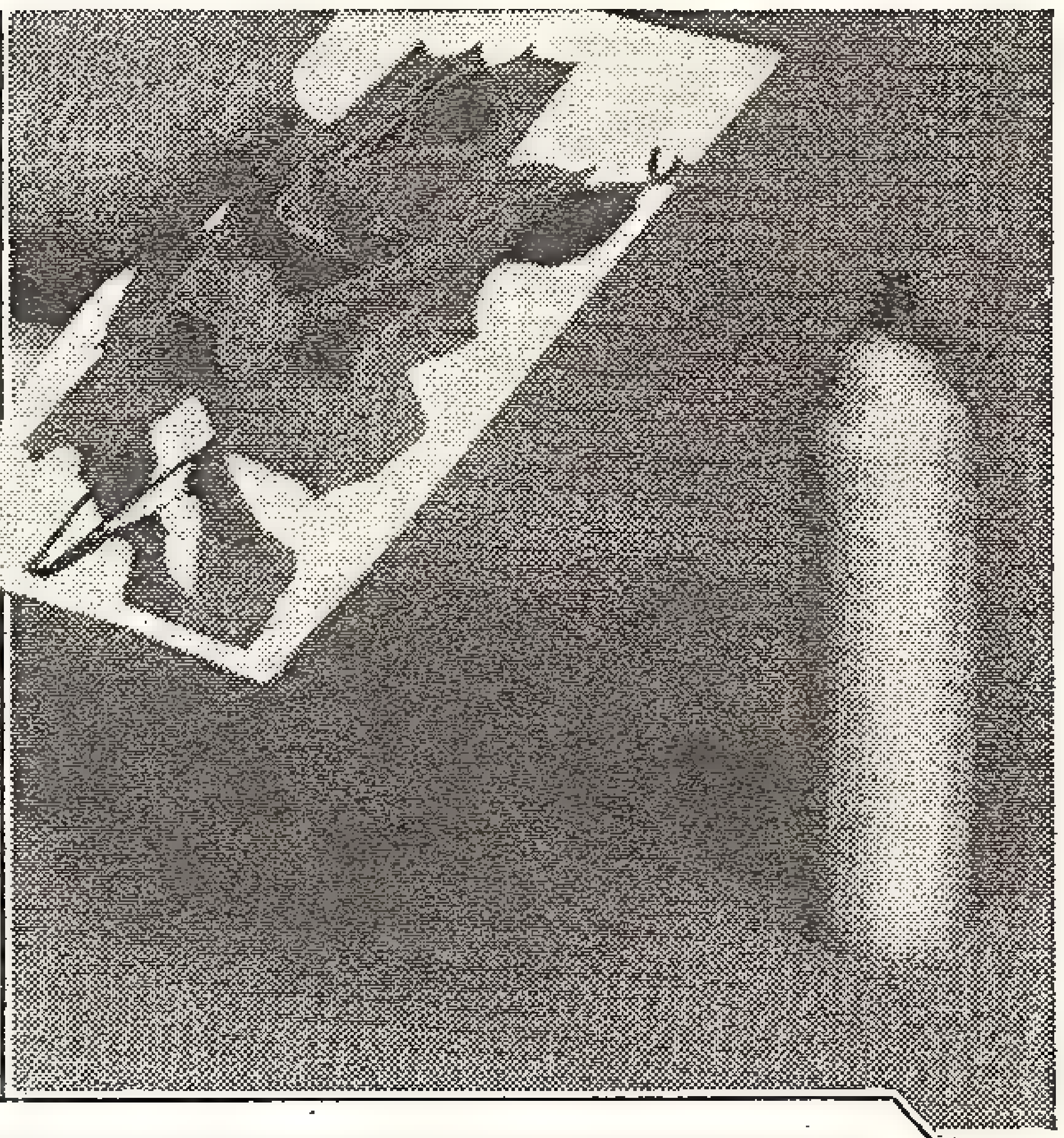
A water glass containing a mixture of ice and water was placed in the box for testing purposes. After about three hours the ice had melted, and at the end of eight hours the water was still ice-cold. A larger quantity of ice probably would have remained solid for a longer time, because it could absorb more heat from the inner walls before melting completely.

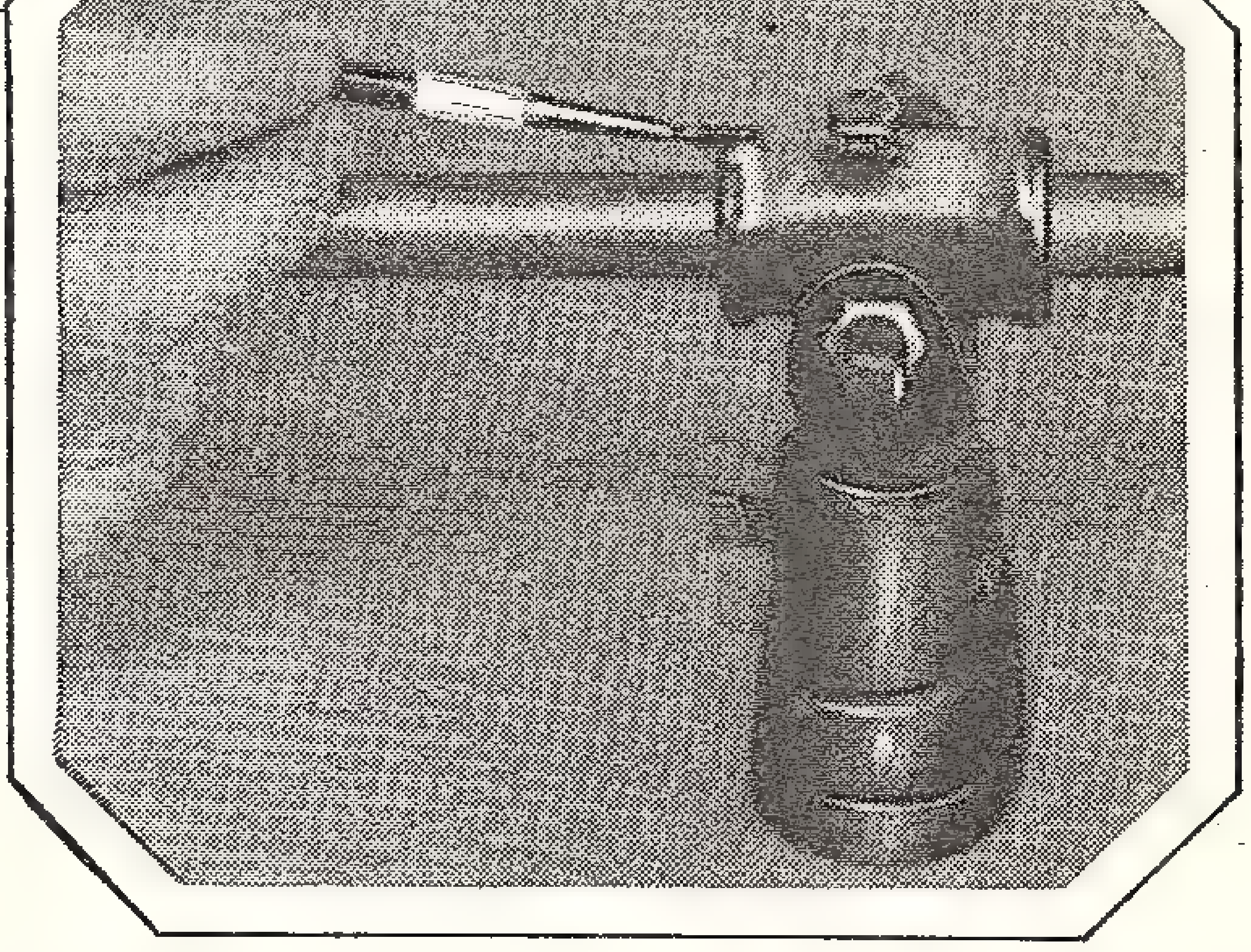
The box can be decorated in any way you wish, or set in a special sturdy frame on a small table.

Chemical Fun for the Home Laboratory



Substances placed within this pipe retort are subject to chemical decomposition when heated sufficiently by the burner. The gases evolved pass into an empty bottle, then into a bottle containing water or some other liquid.





The painted flower will change colors when heated over candle. Bearings painted with the same chameleonic colors do the same and indicate that the metal is running hot.

THE chemically inclined will be interested in carrying out these two simple experiments. The first has to do with paints which change their colors. This chameleonic virtue is the property of some chemicals when heated.

Red iodide of mercury mixed with a vehicle such as thinned clear spar varnish, gum arabic solution, collodion, or celluloid-acetone solution makes an ideal paint which changes from red at room temperature to yellow when its temperature is raised.

The double iodide of mercury and copper is scarlet and when heated to 158 degrees F. turns black. This is made by adding a solution of potassium iodide to a solution of copper sulphate until the precipitate, or "cloud" which is formed, dissolves or disappears. Then a strong solution of mercuric chloride is added, which will precipitate the red double iodide. This is allowed to settle, and the clear water poured off. Then fresh water is added, allowed to settle, and poured off again to purify it.

The double iodide of mercury and silver is made the same way, only to potassium iodide solution is added a solution of silver nitrate, until the precipitate redissolves. Then mercuric chloride solution is added which will precipitate the yellow iodide of silver and mercury. It changes color at 113 degrees F.

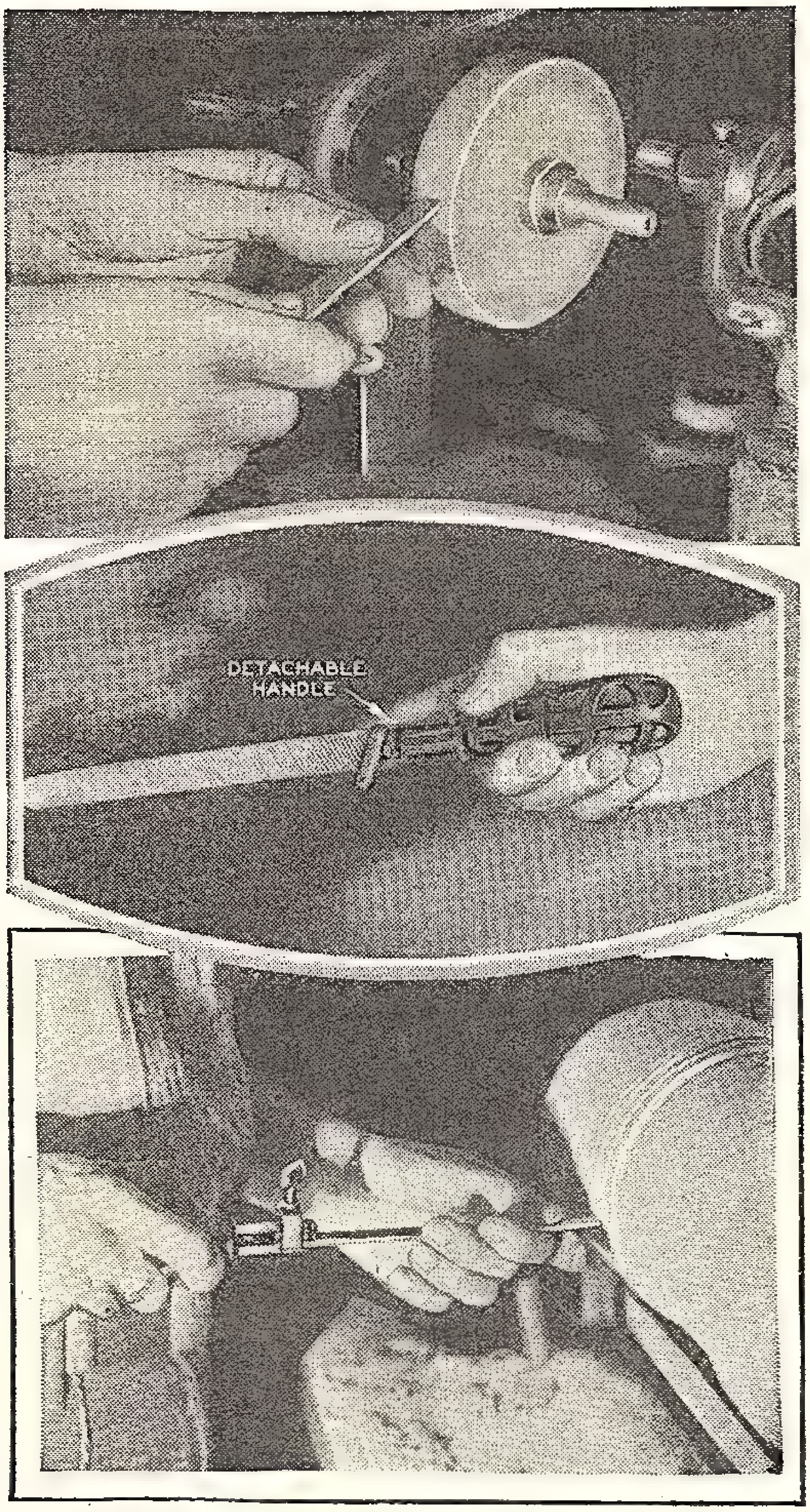
The paints have numerous applications. One may paint bearings with them, using a suitable vehicle as given above to indicate when the bearings are running hot. Flowers and other cut-outs so painted will change their color when held over a hot radiator, candle flame or lighted cigarette. One may try the paints on automobile radiators, just back of the filling cap, as a means of ascertaining when the engine is overheating.

The second experiment has to do with the chemical fun to be had with a pipe fitting "retort." A 6 in. length of 2 in. pipe, capped at one end and fitted at the other end with a ⅛" delivery tube by means of a reducing socket, is used. Substances placed within the pipe retort will be subjected to chemical decomposition when the retort is heated by means of a Bunsen burner. The gases evolved should be passed into an empty bottle, then into a bottle containing water or other suitable liquid.

Marble heated in the retort changes into lime and carbon dioxide gas escapes from the delivery tube. If the issuing gases be passed through lime water in the second bottle, the water will be turned milky.

A mixture of manganese dioxide and potassium chlorate will produce oxygen gas when heated. Magnesite, a mineral (magnesium carbonate), will produce magnesia (magnesium oxide, MgO) when heated, and also carbon dioxide gas.

Worn-out Files Make Excellent Work Shop Lathe Tools



Top view shows file being ground into a chisel. Handle may be attached as shown. Lower photo, chisel at work.

WHY spend money for lathe tools when you can make excellent ones from worn-out files? Such files can be found around almost every work shop and, if not there, can be purchased for practically nothing. Flat files are preferable as they will make a greater variety of turning chisels, although round and square ones can sometimes be used.

The file is converted into a chisel on a grinding wheel. First, grind the teeth from the end of the file away from the handle. Be sure to smooth all rough edges so they will not cut the hands in future use. Then grind the end to the desired shape; round, angular or square. Finish on an oil stone.

You can provide each tool with a handle, use a clamping-type file handle for several chisels, or employ the tools without handles by simply cutting off the pointed portion of the file. You will find that the steel is of excellent quality, and will hold an edge for a long time.

Unique Death Test Easy to Apply

ANOTHER test of death, said to distinguish infallibly between real death and mere suspended animation, has been recently devised. The test consists in squeezing one of the eyes of the supposed dead person between two or more fingers with considerable pressure, but not enough to damage or burst the eyeball.

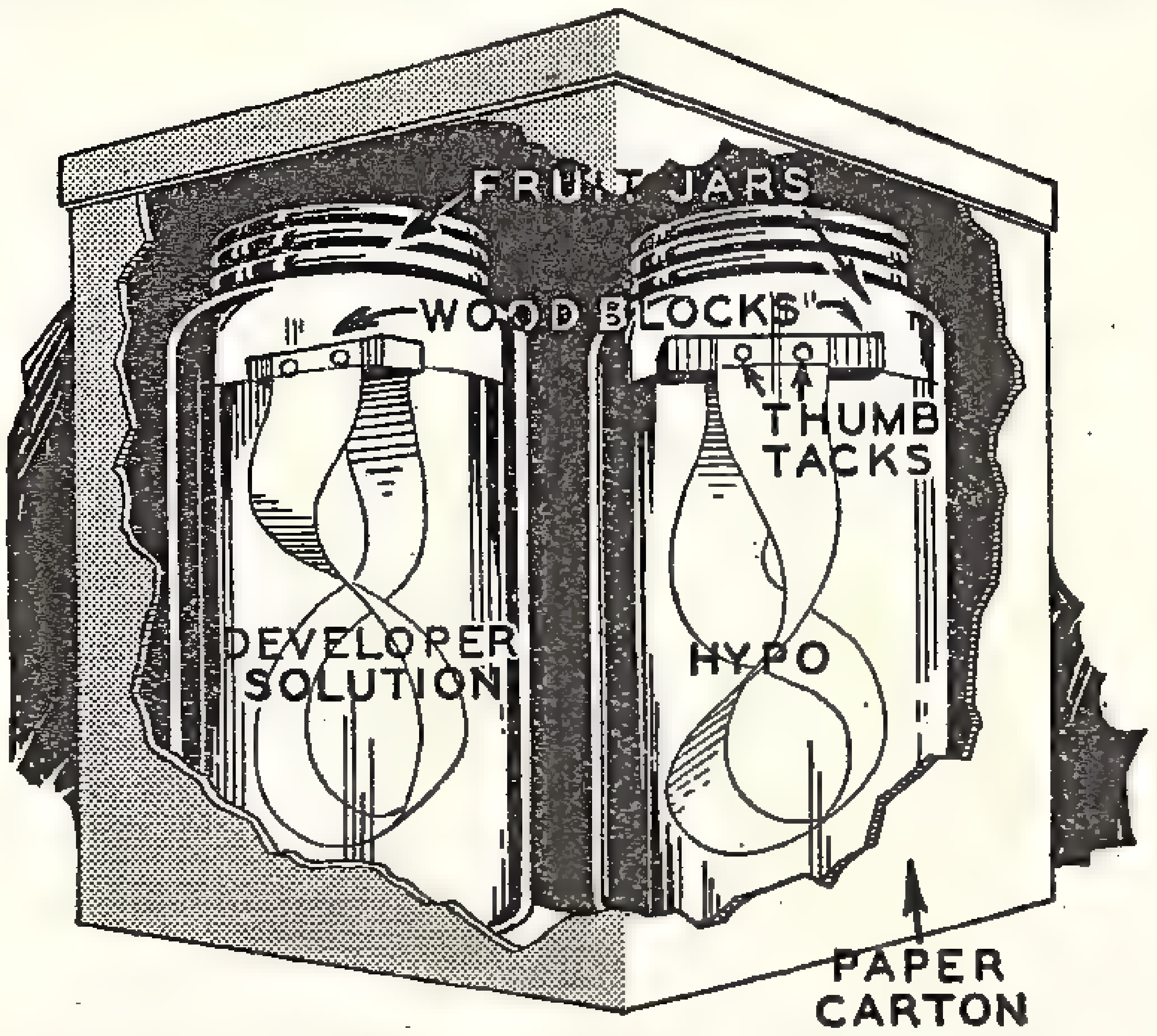
In a dead body, this pressure will change the pupil at the center of the eye from its usual circular shape to some other shape. If the person is still alive, even though unconscious and showing no ordinary sign of life such as breathing or an audible heartbeat, the pupil will remain round no matter how hard one squeezes.

The test was applied successfully to 649 dead bodies and to 6 cases of apparent death in which the persons were alive.

Here Is a Kink That Develops Vest-pocket Films Without Watching

A GERMAN technician recently devised a new method of developing vest-pocket roll films that is inexpensive and requires no watching. Take two glass jars of two quart capacity, preferably with screw tops, and mark one "developer" and the other "hypo." Enclose them in a carton box and stuff the extra space with crushed paper. Two buoyant blocks of wood and four thumbtacks complete the equipment.

Fill the glass jar marked "developer" almost to the top with water and add two ounces of liquid developer. To develop the films, retire to a dark place or use a changing bag. Detach films from their paper covering and fasten the ends to the block of wood. Before submerging, dip them in the "developer" to prevent air-bubbles. Leave for several hours and then plunge into a bucket of water a few times before immersing in hypo.



Here is an illustration of complete developing apparatus.

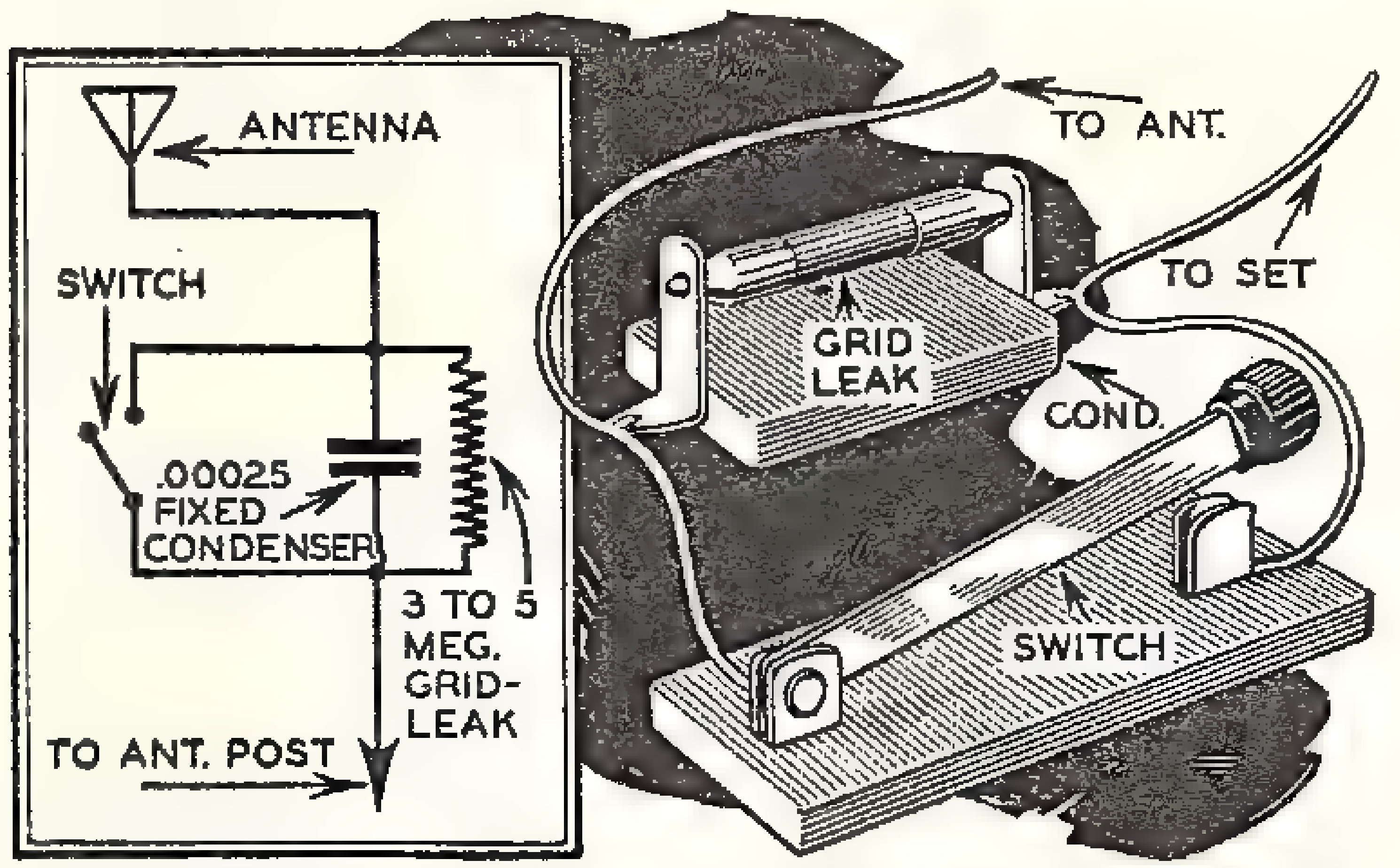
SPARKS from the RADIO EDITOR

Edited by L. B. ROBBINS

How to Hook Extra Receivers to Antenna

THE rabid short wave fan and radio constructor in time will probably collect several receivers beside the broadcast set. By using the stunt shown in the sketch one antenna can be utilized to feed several receivers, all operating on different frequencies.

Erect one good antenna system for the broadcast set and allow a branch of it to come into the short wave shack and stretch overhead in a horizontal line. Then connect each other receiver to it as shown. This consists of coiling from six to twelve turns of *insulated* wire around the antenna; spacing the turns half an inch apart or so and maybe half an inch or more in diameter. A neat way to do it is to slide three or four pieces of very small mailing tube over the antenna and wind the coil on each one. Then you will have a pickup coil ready any time an extra receiver is to be attached.

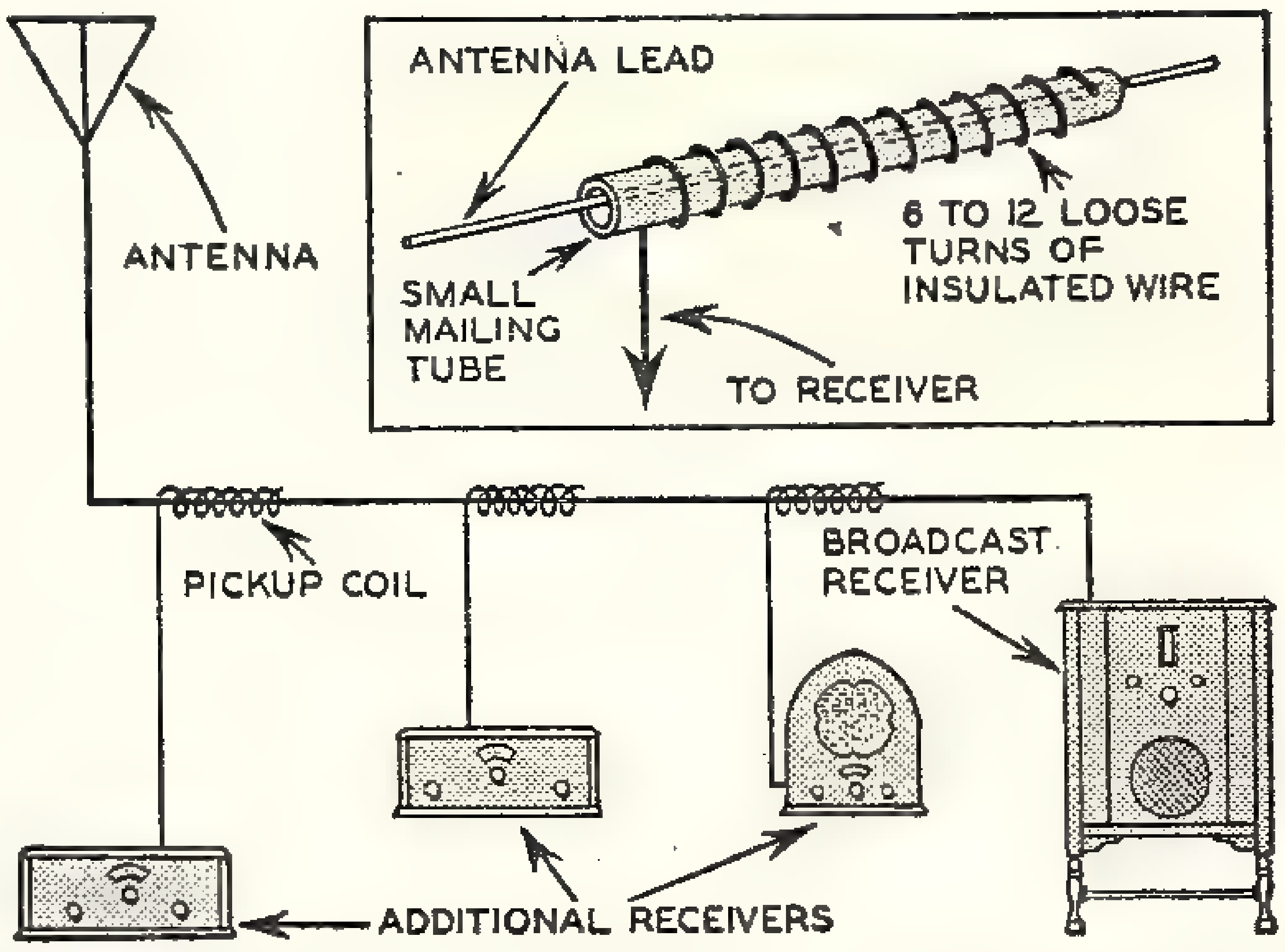

ANTENNA
SWITCH
.00025 FIXED CONDENSER
3 TO 5 MEG. GRID-LEAK
TO ANT. POST
TO ANT.
TO SET
GRID LEAK
COND.
SWITCH

With condenser, grid leak and switch hooked into antenna circuit as illustrated here, crashes of static are softened considerably, while signals come through loud as ever.

Try This Stunt to Reduce Static

AN EFFECTIVE stunt for reducing static consists simply of breaking the antenna lead-in wire and inserting a common grid leak and condenser. A .00025 fixed condenser appears to be about the right capacity. The grid leak can be the common receiving type and preferably 1 meg. or higher. Lower resistance values seem to allow too much signal strength to pass. Shunt the condenser and leak with a switch as illustrated in the drawing.

The idea is, of course, to allow some of the static discharges to back up through the leak. The condenser acts as coupling from antenna to grid coil. On loud locals and with a low leak value, much of the crashing static is cut out.


ANTENNA LEAD
6 TO 12 LOOSE TURNS OF INSULATED WIRE
ANTENNA
SMALL MAILING TUBE
TO RECEIVER
PICKUP COIL
BROADCAST RECEIVER
ADDITIONAL RECEIVERS

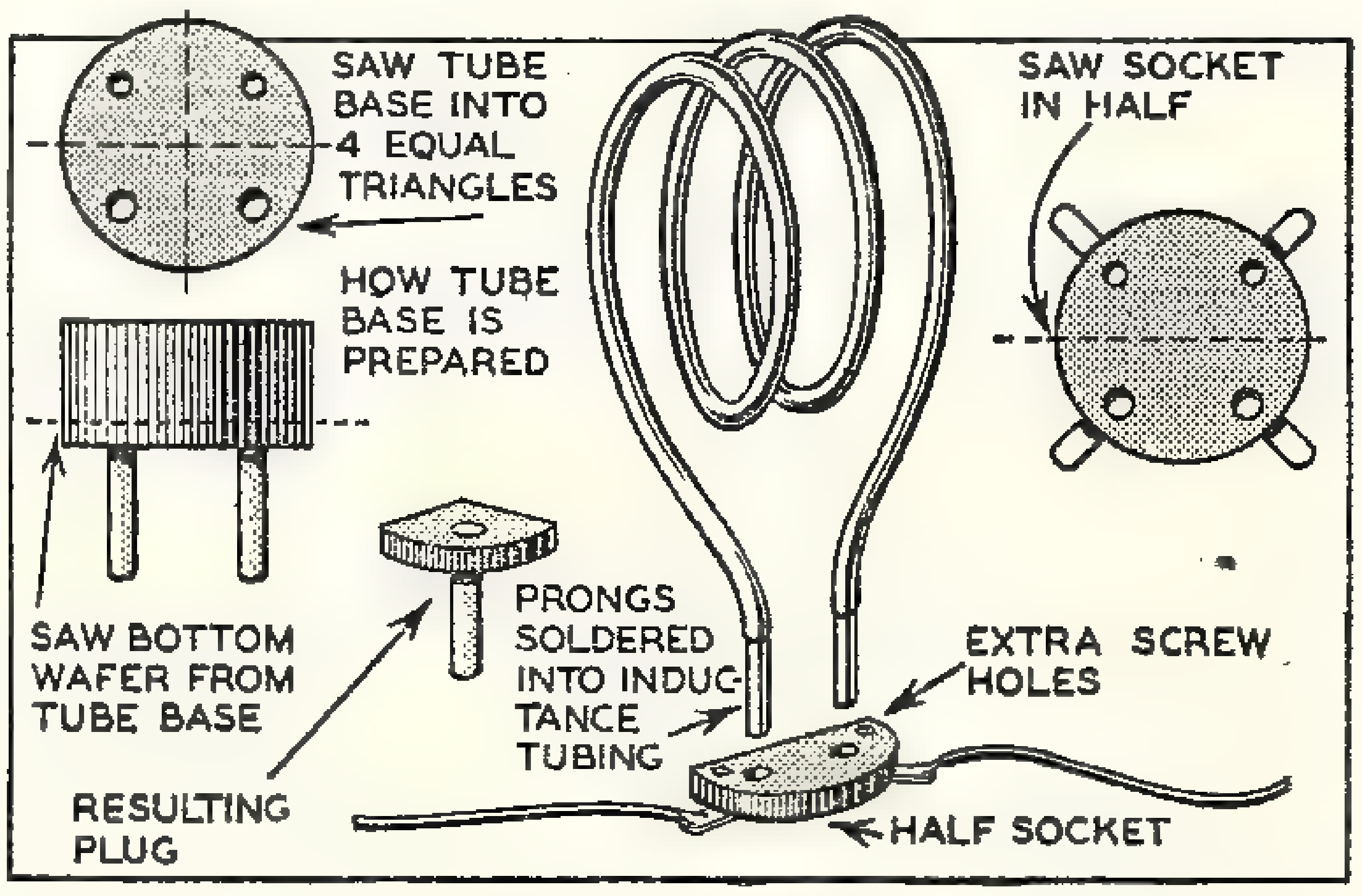
Taps are taken off the broadcast antenna for extra receivers by inserting small tube over lead in and wrapping with short length of wire, which leads to the set.

Plug-in Coils Use Tube Bases

THERE are many occasions when it is an advantage to plug in choke coils, inductances, etc., but the lack of plugs and jacks is a handicap. Good "plug-ins", however, can be made by the amateur.

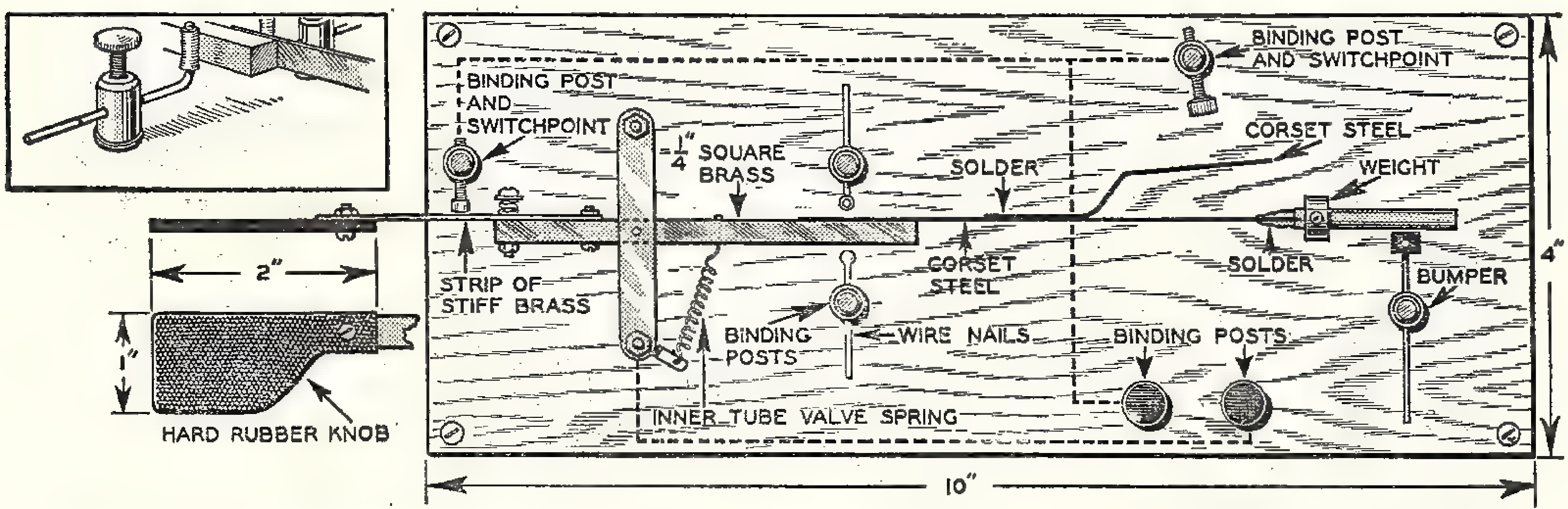
First cut off the shell of the tube base leaving just the wafer at the bottom. Then saw this into four equal parts each containing a prong. Then cut the socket into halves or quarters as your needs dictate and provide each section with screw holes for fastening to the baseboard. The prongs can be soldered to the inductance ends as suggested and plugged direct into half a socket, or they can be used separately.

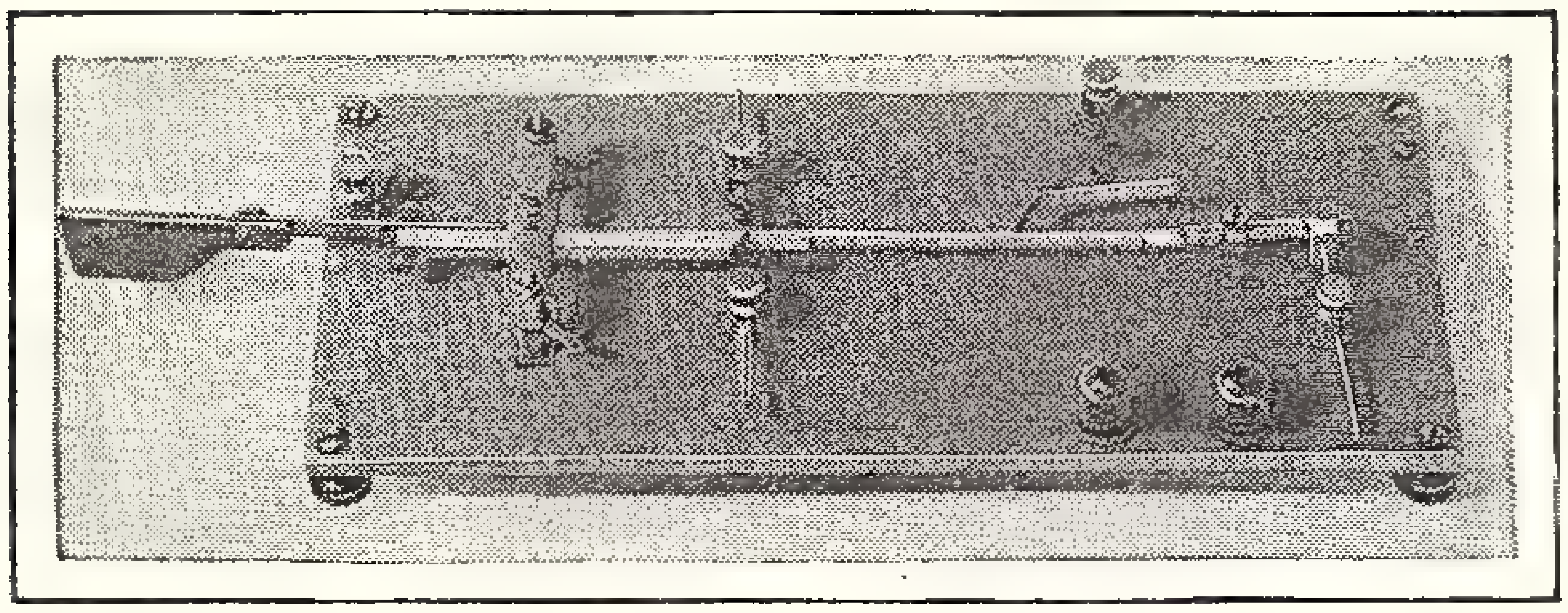
This plug-in arrangement will prove ideal for short-wave transmitters in which inductance coils have to be changed to shift from one wave length to another.

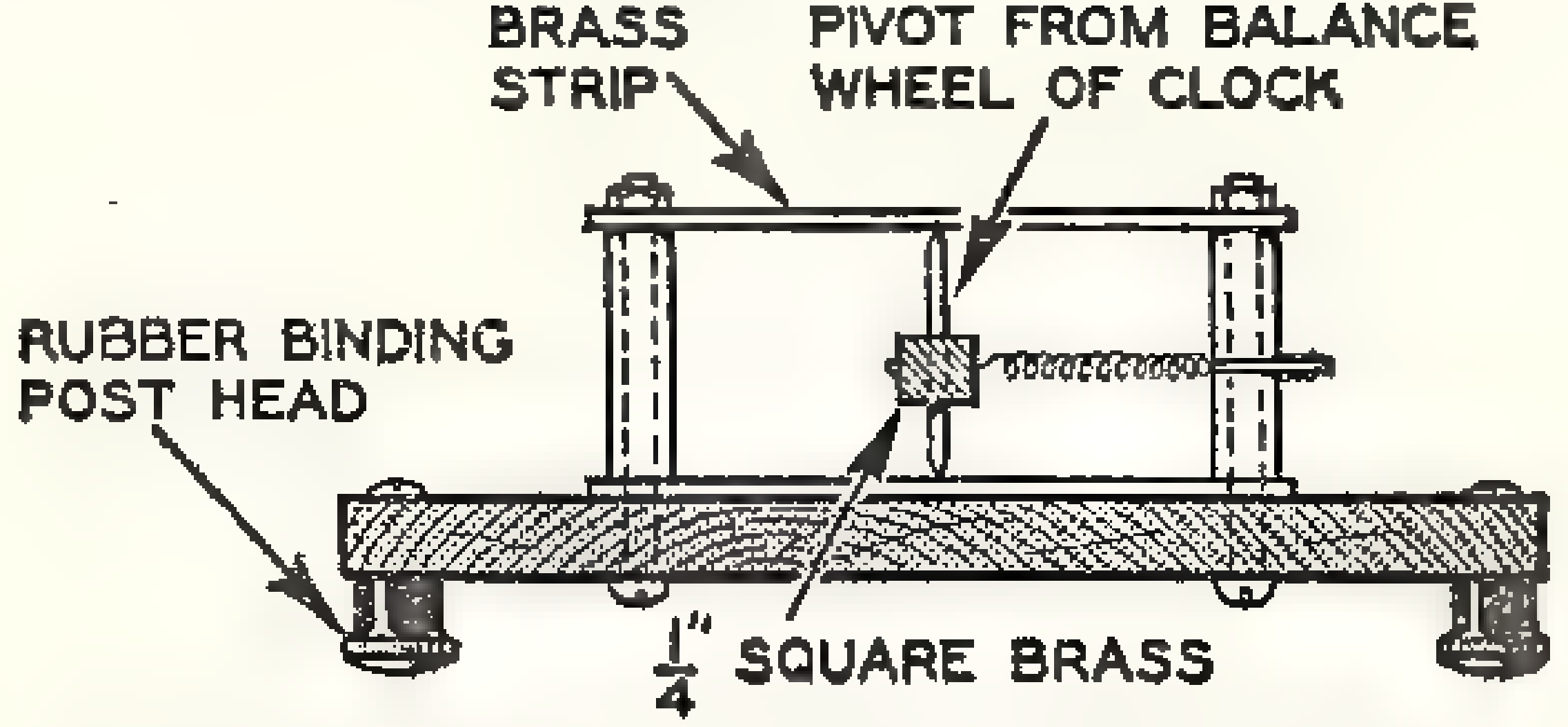

SAW TUBE BASE INTO 4 EQUAL TRIANGLES
SAW SOCKET IN HALF
HOW TUBE BASE IS PREPARED
SAW BOTTOM WAFER FROM TUBE BASE
PRONGS SOLDERED INTO INDUCTANCE TUBING
EXTRA SCREW HOLES
RESULTING PLUG
HALF SOCKET

Inductances are soldered into tube prongs, which are inserted into base connections as illustrated in drawing.

An Easily Made Bug for High Speed Transmitter Hounds







Assemble the parts for the "bug" as illustrated in the drawings here. Throwing the knob to the left makes a dash, while throwing to right makes a series of dots, speed depending on springiness of steel and weights on end.

WHEN a man becomes really enthusiastic about the amateur radio transmitting game he yearns for a high speed key for rapid fire operating. The ordinary key is incapable of the speed of the "bug" but the cost of the latter is often prohibitive.

The bug shown in the photograph was built entirely of spare junk around the shop and works just about as nice as could be desired. Moreover, there is no machine work to be done as all parts can be turned out with the simplest tools. The cost is practically nothing.

The base consists of a piece of thin wood 10 in. long by 4 in. wide mounted on four "feet" consisting of a hard rubber binding post head under each corner. The pivoted arm consists of four parts. The main portion is a piece of ¼ in. square brass about 4 in. long. To one end is soldered a piece of narrow corset steel 4 in. long and to the other end is bolted a strip of stiff brass to project beyond the end about 1½ inch.

Steel Spring Gives Vibrating Action

A second piece of corset steel should be bent in the form indicated and soldered to the first in about the location shown. Now to the end of the brass strip bolt a knob consisting of a piece of bakelite or hard rubber cut in the shape shown in detail. At the rear end solder some sort of weight. In the bug shown this weight consisted of a short piece of variable condenser shaft fastened on with a collar and set screw.

The pivot frame was taken from an old alarm clock but any similar affair can be used. The pivot was that supporting the balance wheel. A small hole was drilled through the brass piece about a third way down its length from the rear end and the pivot forced through and soldered. The pivot was then mounted in its frame and the latter fastened to the base in the position shown. Tension of the pivot bearings was then adjusted so the arm swung freely but without lost motion.

The brass bar of the arm should swing in a space about ½ inch wide and this was formed by two binding posts holding two wire nails bent up at right angles and these verticals covered with spaghetti.

Making the Bumpers

Now near knob and contacting the brass strip is placed a binding post into which is adjusted a switchpoint as shown. This contact occurs when the brass bar is centered between the bumpers. A second binding post and contact is placed opposite the projecting corset spring so it normally rests about ½ inch back. Then a rear bumper is placed near the end of weight in the position shown.

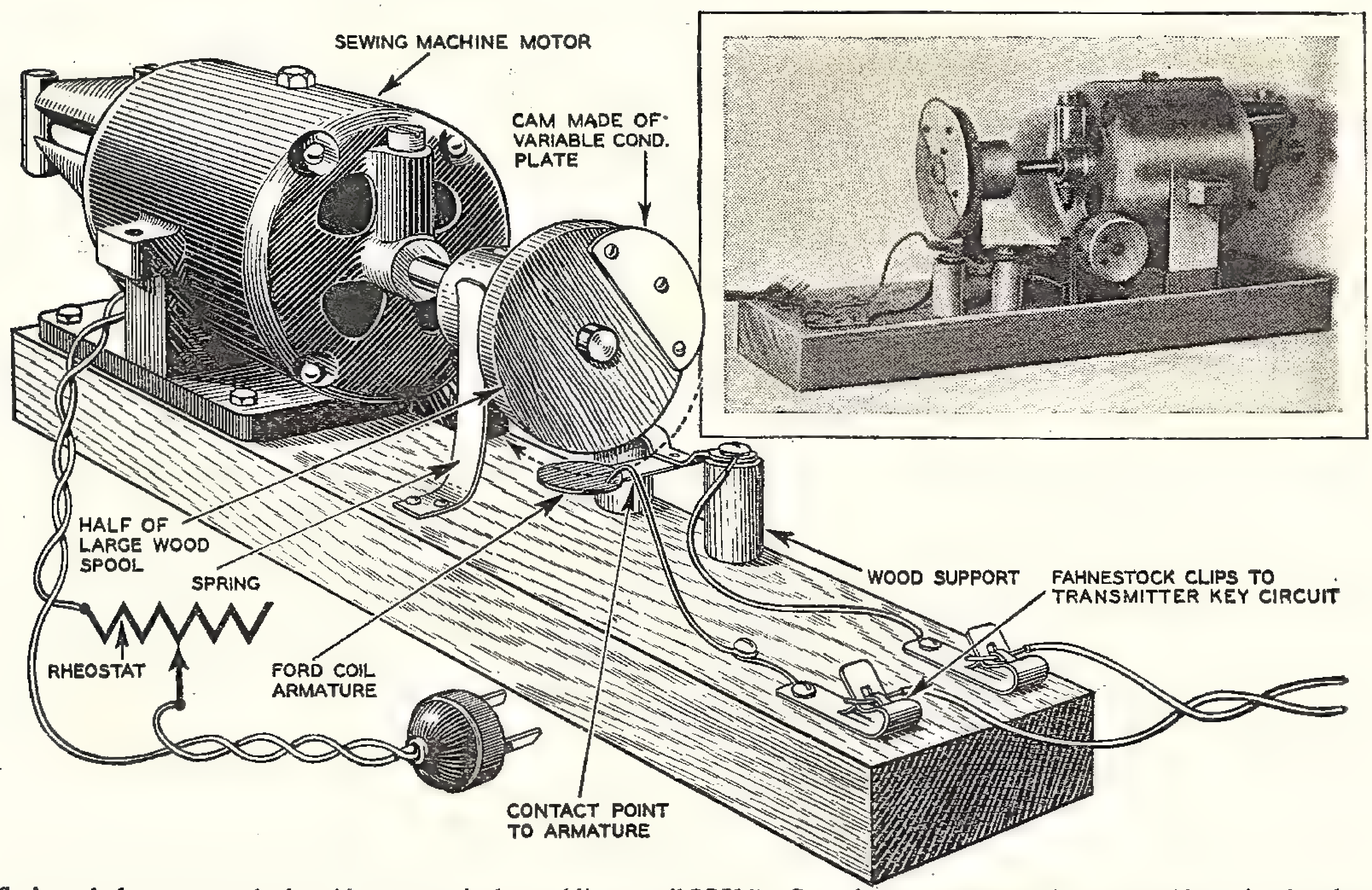
This bumper can be made as the two bumpers ahead are made, or instead of spaghetti a small piece of eraser can be speared onto the upright part of the nail. Lastly connect an inner tube valve spring in the position indicated. This spring tension must be regulated to obtain the proper working tension.

Arrange two circuit binding posts at one edge of the base and connect them as shown by the dotted lines. One connects to the frame and the other to the two stationary contacts.

When completed the bug can be hooked into the key circuit or shunted across it as an auxiliary key. Its action is as follows: When the knob is pressed to the left so the brass strip contacts its binding post the circuit is completed and a dash is made as

(Continued on opposite page)

Automatic Signal Key Makes Dots While You Stand By


SEWING MACHINE MOTOR
CAM MADE OF VARIABLE COND. PLATE
HALF OF LARGE WOOD SPOOL
SPRING
RHEOSTAT
FORD COIL ARMATURE
WOOD SUPPORT
FAHNESTOCK CLIPS TO TRANSMITTER KEY CIRCUIT
CONTACT POINT TO ARMATURE

Series of dots are made by this automatic key while you "QRX." Cam forces armature down, breaking circuit, then lets it rise again to close circuit. Spring which rubs against hub of the spool should be adjusted to provide even speed.

THIS crazy looking gadget that looks like a coffee grinder is nothing more than an automatic signal key built by the radio editor to operate his transmitter during a short period when he had to "stand by" for some reason or other. During that period the fellow at the other end could hear a series of rapid dots and thus hold the wave until the operator could again get back to the key.

First, an old sewing machine motor was mounted horizontally on a piece of board. Then a large wooden spool was sawed in half lengthwise and the bobbin end driven on the motor shaft to make a tight fit.

Then an old variable condenser plate was fastened to the spool flange as illustrated. Just below the spool flange was arranged a Ford coil bridge or armature held horizontally by being mounted on two pieces of wooden film spool as shown. In front of this armature was arranged a hook of stiff wire so the end pointed down and made light but positive contact with the surface of the armature.

When the cam is at the bottom it should push down the armature so contact between it and the wire point is broken. Connect this contact point and the armature supporting bolt with two wires leading to the two binding posts or clips at the end of the baseboard.

Before plugging in the motor insert either a variable resistance or a lamp socket in series with one of the 110 volt wires. Vary the resistance so the motor turns over about twice a second. A 25 watt lamp inserted in the circuit will give about the right speed. Then again the brake strip against the spool will help. The action can easily be seen. Two "dots" a second are made if the motor is turned over at the right speed.

When the cam is up contact is made and the transmitter is in operation. When the cam is down the contact is broken and the transmitter is silent. A switch should be arranged so that the automatic sender can be cut into the circuit easily when you have to stand by for some reason. The dots issuing from the transmitter will enable your listener to keep on your wave.

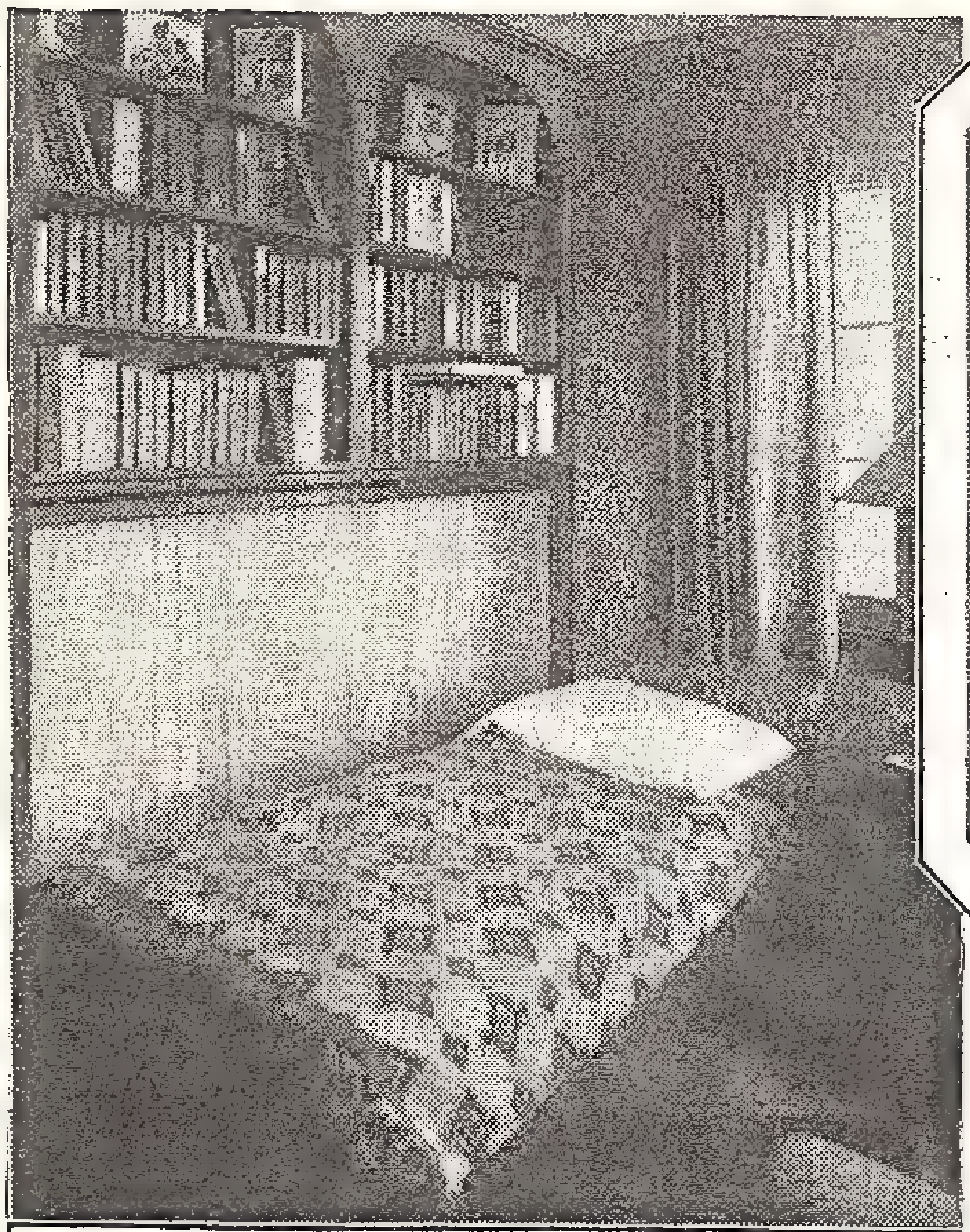
An Easily Made High Speed Bug for Fast Sending Transmitter Hounds

(Continued from opposite page)

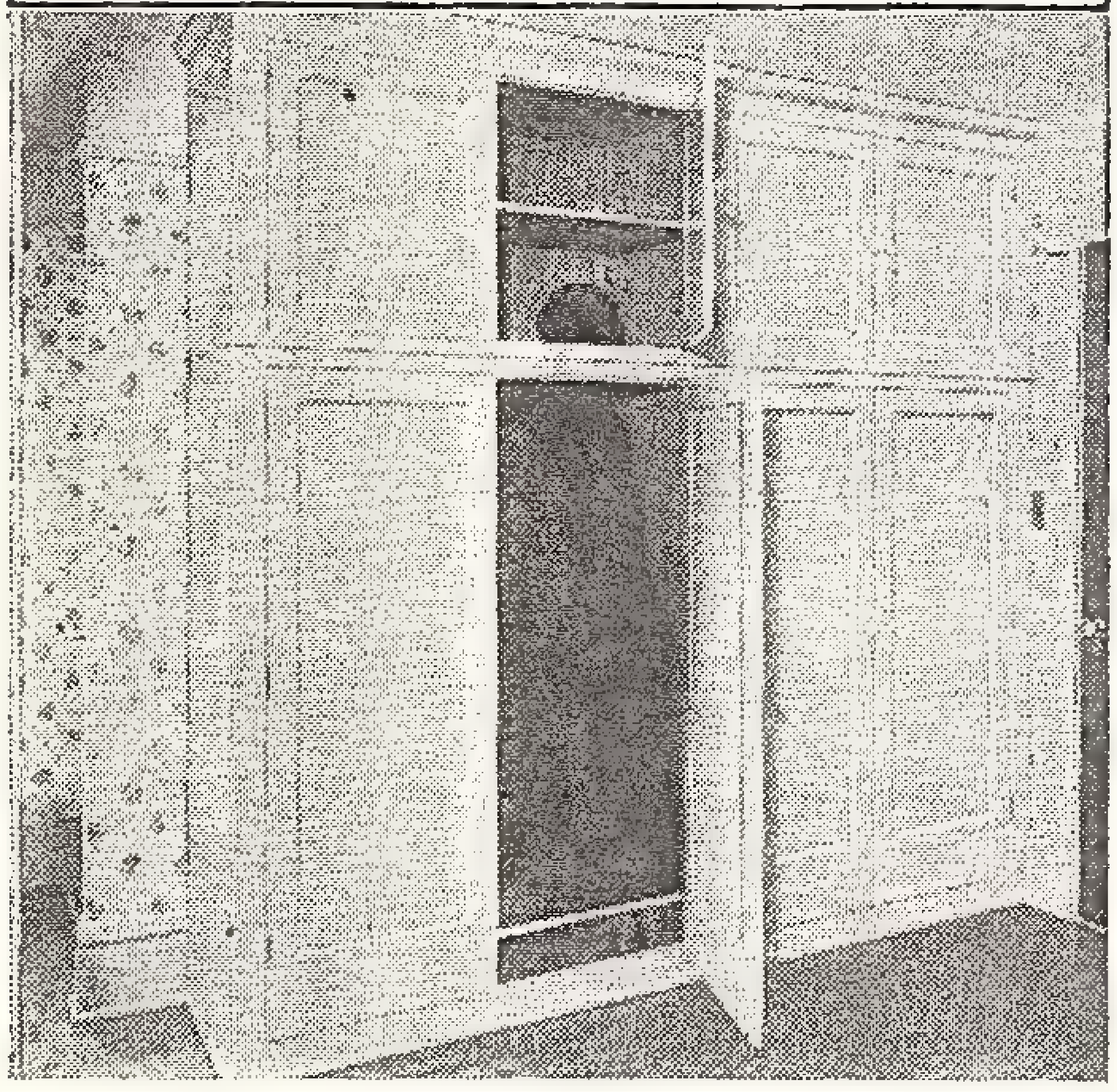
long as the contact is maintained. Releasing the knob the spring carries the pivoted arm over and the piece of corset steel vibrates against contact, the rear contact making dots at each contact. This rate of vibration is greatly determined by the size of the weight and the flexibility of the spring, which you can adjust to suit.

There is nothing complicated about this bug; the only thing being to adjust the spring tension and the weight to vary the rate of oscillation of the arm. The contacts can be varied by screwing the contacts in or out of their binding posts until the proper balance is obtained.

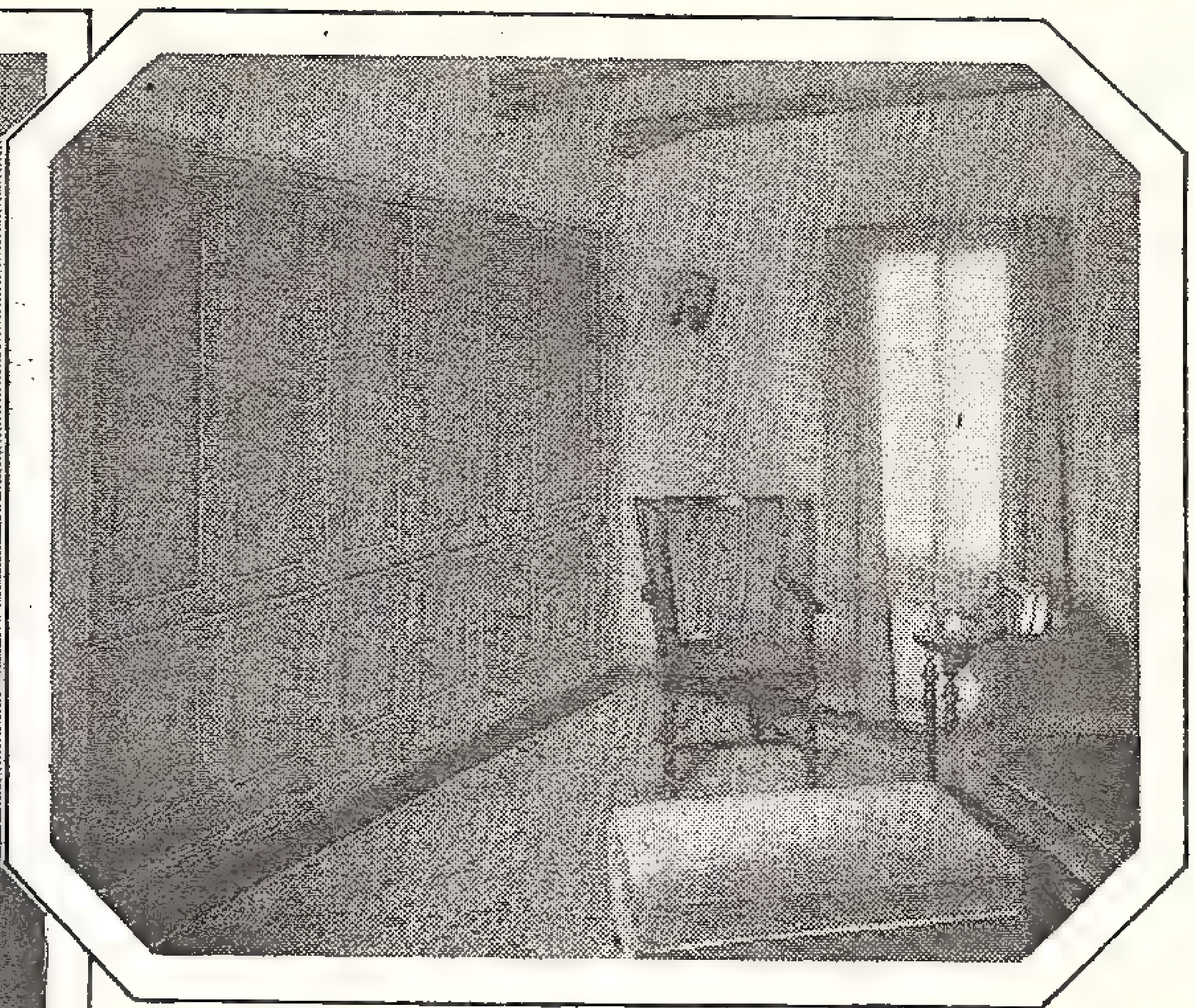
Up-To-Date Homes Have



Bed is equipped with springs that fasten to inner panel. When bed is open, it rests on two leather-covered stools built especially to support it.



Even in a house where the doors are finished walnut or oak, these cedar-lined wardrobes are usually enameled to match the baseboards and door frame of the room.



Behind these attractively stenciled doors of walnut are hidden magazines and books, containing valuable information, that are no longer presentable to the house guests.

ALTHOUGH there has been a gradual but drastic change in home-building in the last few years, at least one demand has remained constant, and that is the home maker's insistence upon ample accommodations for books, kitchen utensils, provisions and clothing.

Although today's home is smaller than the Victorian home, more space is given to book shelves, cupboards, and closets than heretofore, and the space is utilized to better advantage. The accompanying photographs show practical ways of handling these features.

The arrangement of the kitchen cupboards shown is perfect. The commodious bins and shelves furnish plenty of room for groceries, cooking utensils, flavorings, cleaning powders, soaps, kitchen linens and china.

Suites of kitchen units may be bought either of the detachable type or ready to build in. One may begin with a single cabinet and add pieces until the entire available wall space is covered.

It is interesting to note that the kitchen space above the refrigerator is no longer wasted in the efficient kitchen but is utilized in the way depicted. This arrangement is thoroughly practical for the refrigerator may be slipped out of the enclosure without disturbing it as the grilled portion is a hinged door.

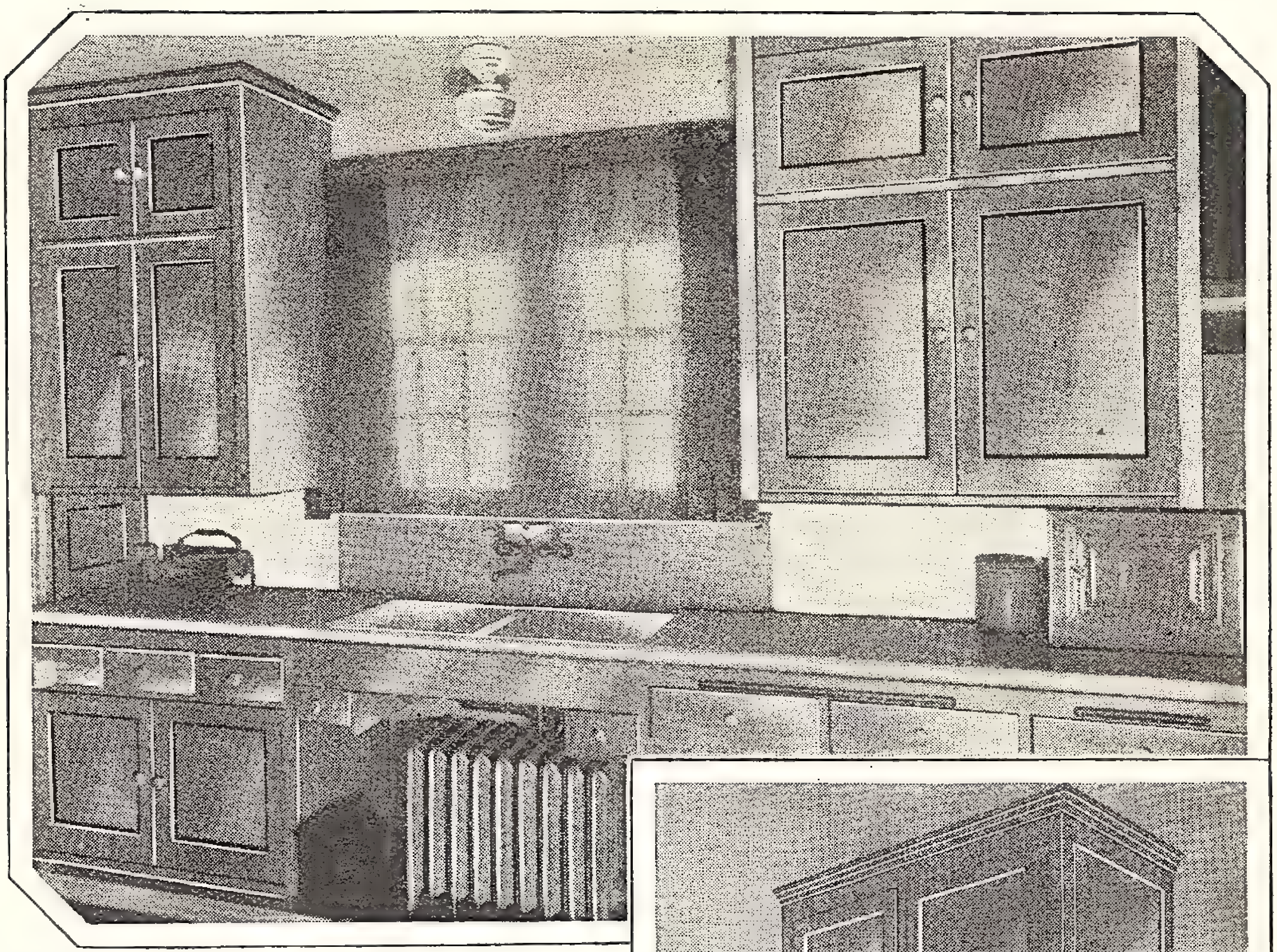
Built-in Wardrobes Are Popular

Built-in, cedar-lined wardrobes are proving very popular both in new and modernized homes. The usual arrangement is to have a space at the bottom for shoes and two shelves at the top for hats, the out of season hats going in the top shelf. The double doors to the right protect sliding tray-like drawers of varying depths.

Built-in beds are a convenience in the small home. By using one of them, it is possible to turn a living room, nursery, library, or den into a bedroom at a moment's notice. If desired, these beds can be equipped with box springs and be fully as comfortable as any others. After being made up they are folded back into a closet.

The bed shown is simple in arrangement, the springs being fastened on the door. When the bed is open, it rests on two sturdy, leather-covered stools which were

These BUILT-IN Features



There is plenty of room in these cupboards for all the necessary kitchen utensils. They are stained an attractive shade of green with the panels outlined in cherry red.

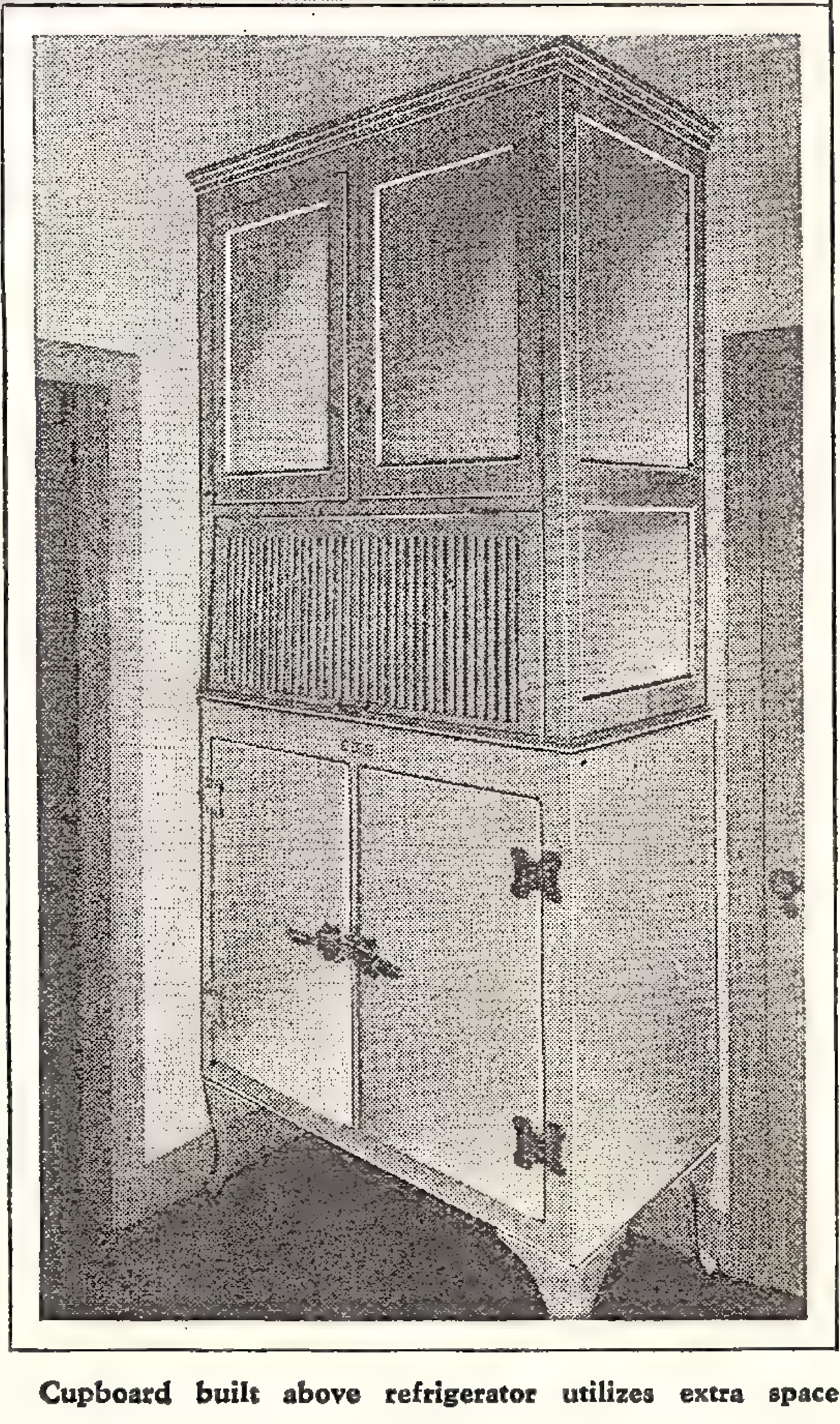
built especially to support it. The room is furnished like a library with a large table and easy chairs. Thus, it does not reveal its double purpose to the casual observer.

Today's magazines contain such valuable material that many people keep them. Unfortunately, magazines do not stay attractive nearly as well as books, so that it is well to have shelves for the older numbers, where they may be hidden from sight. The highly pleasing arrangement shown provides a desirable place for magazines and books that are no longer presentable. Doors and door frames are walnut with a formal design stenciled on them.

Built-in Features Add to Home Value

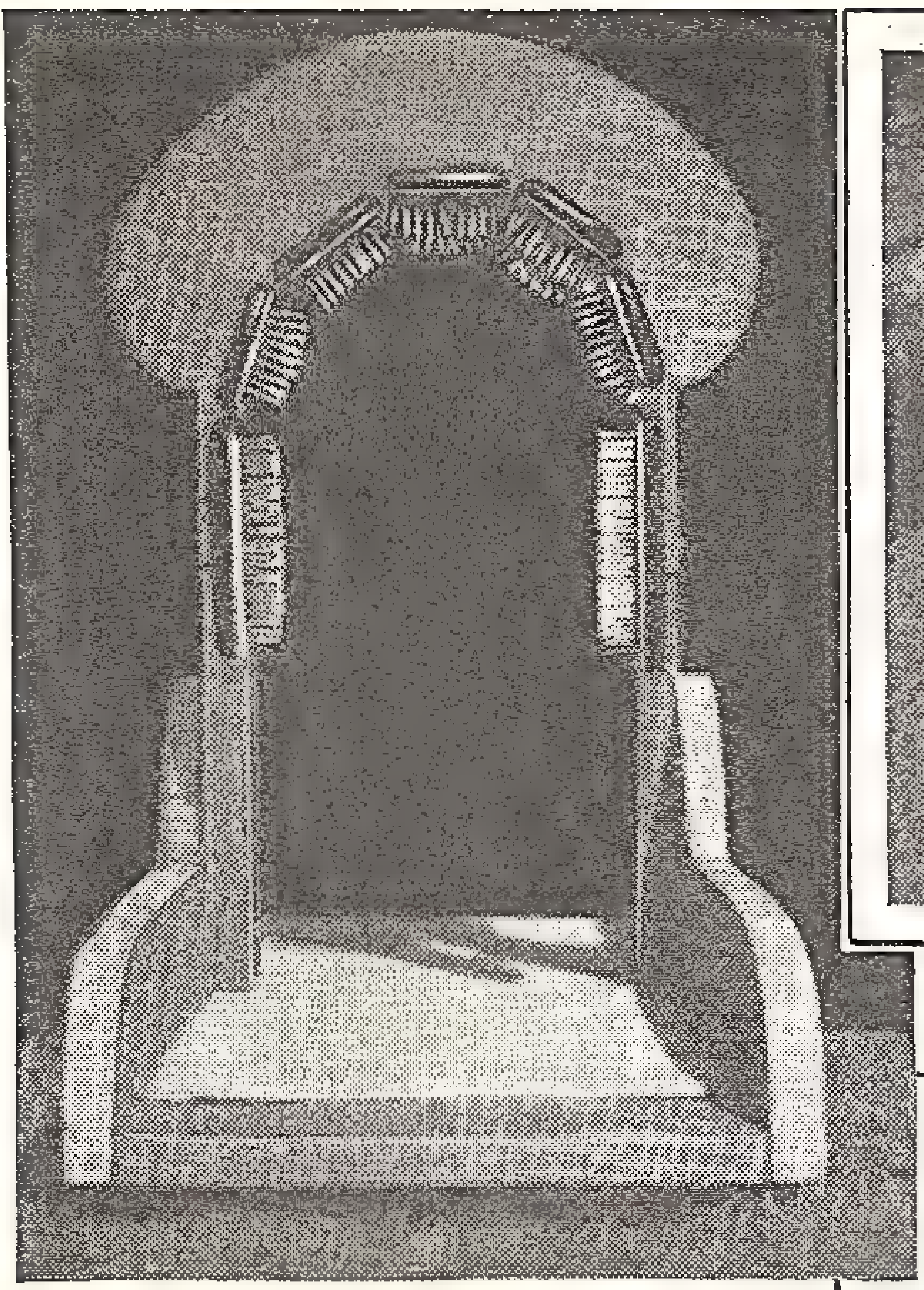
A home can hardly be considered up to the minute today unless it contains the features just described. Built-in features that are well designed add twice their cost to the value of a home, both in dollars and cents when it comes to selling and in the convenience that they afford.

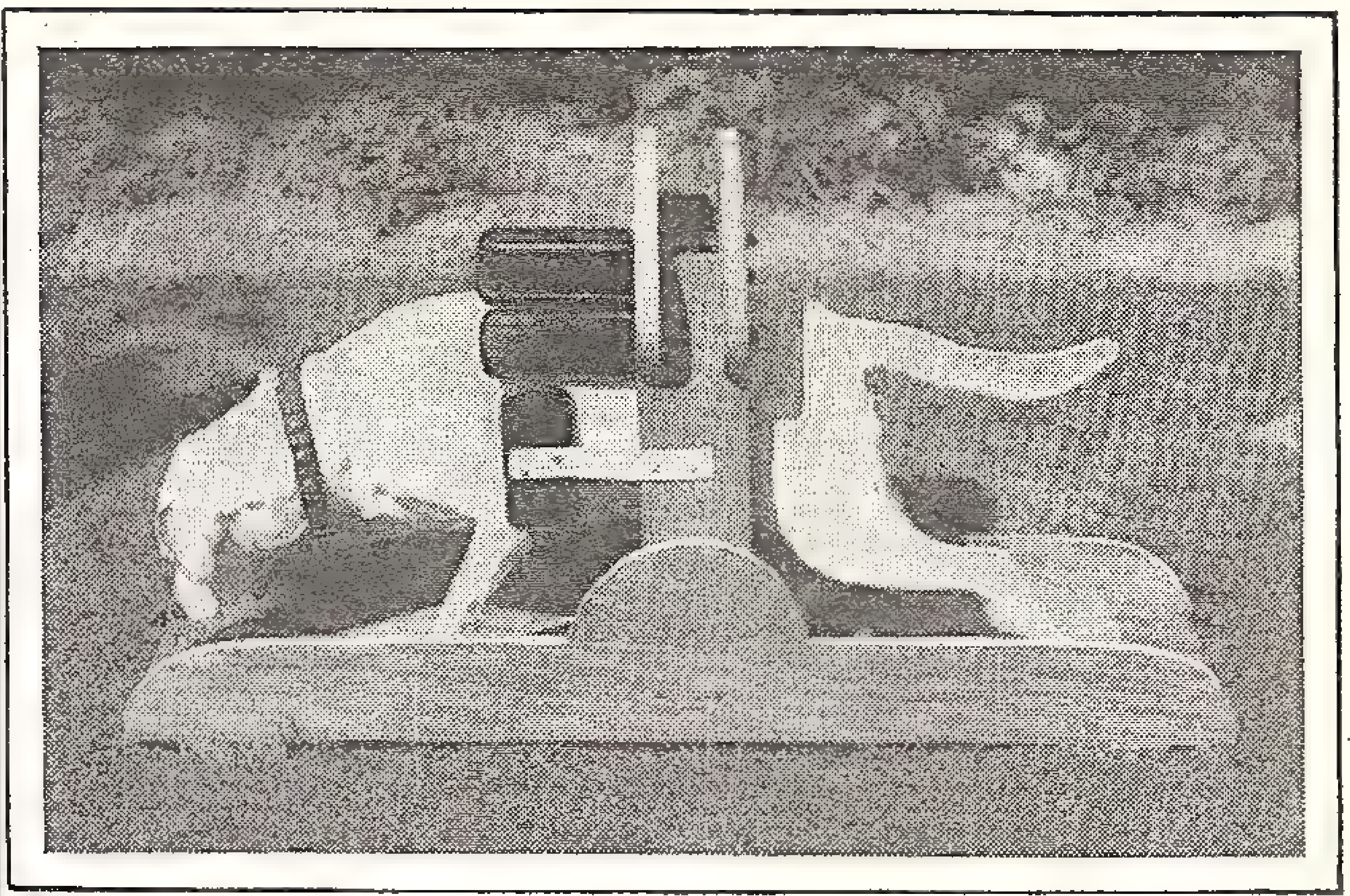
Fortunately, the home owner living in a house several years old may avail himself of any of the features described at little more cost and trouble than the owner can of the home under construction.



Cupboard built above refrigerator utilizes extra space.

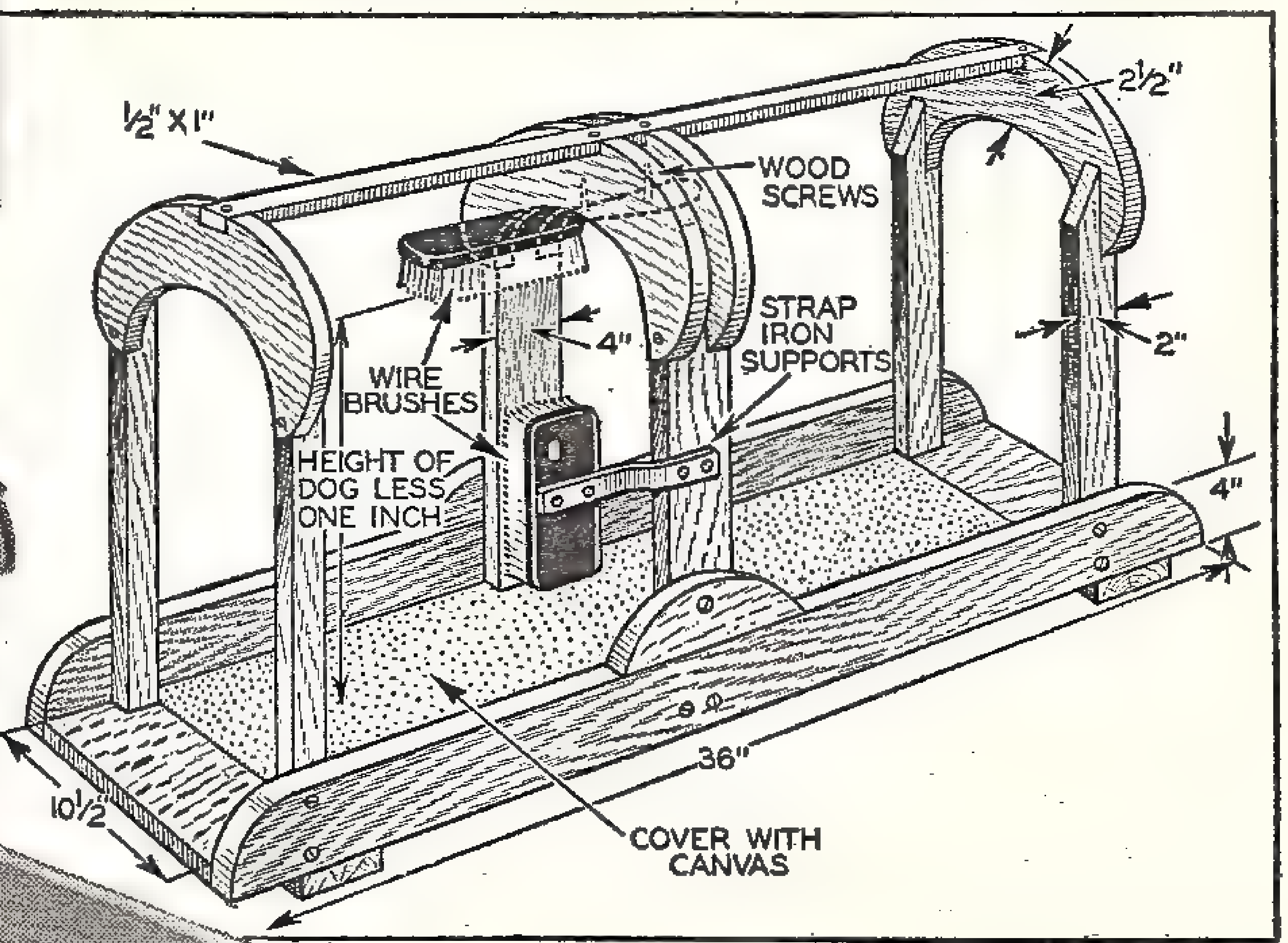
Build a "Towser Tickler" for Your Dog



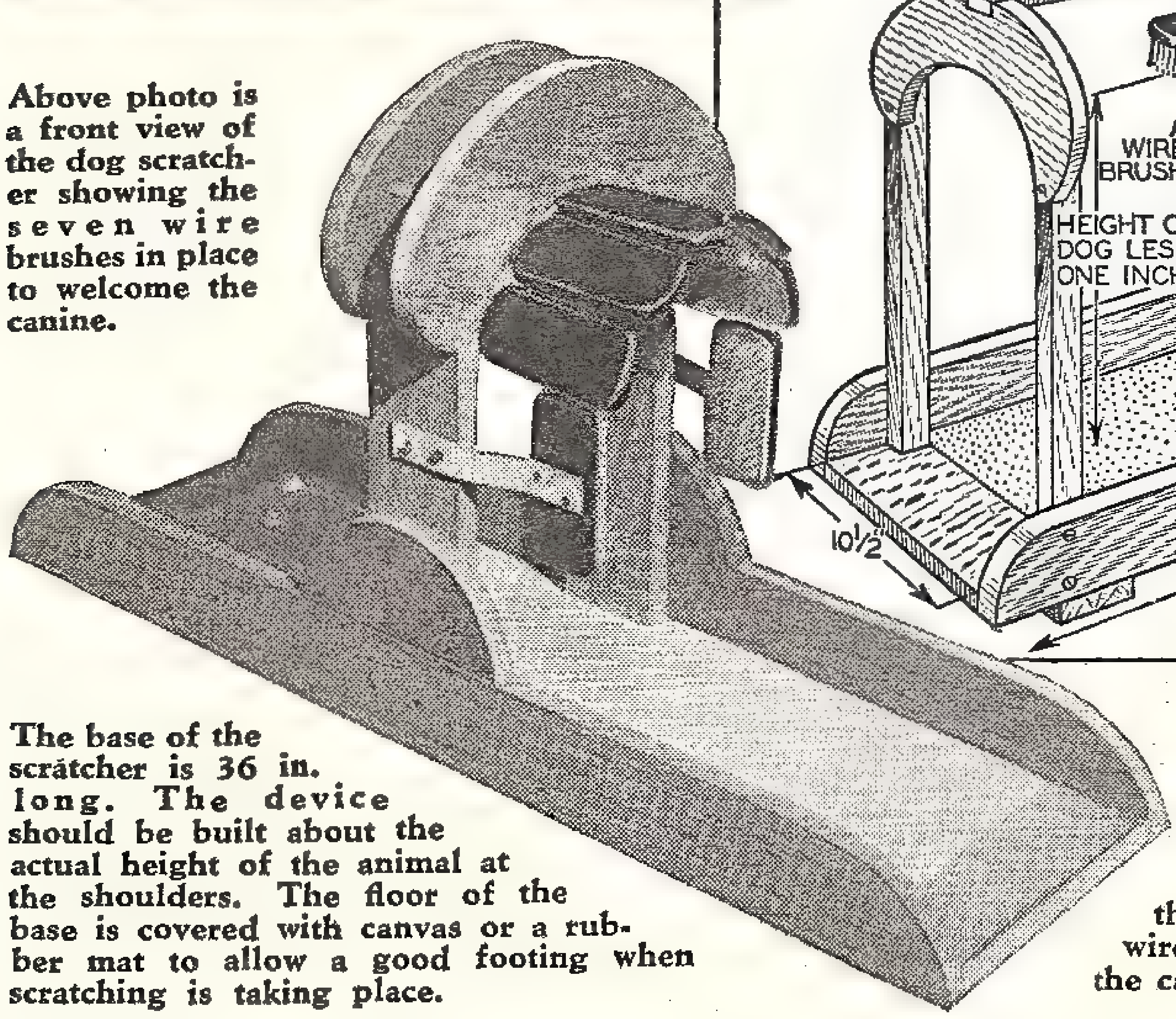


Here you see a side view of the "Towser tickler." Dog scratches its body by a forward and backward movement against the brushes.

Above photo is a front view of the dog scratcher showing the seven wire brushes in place to welcome the canine.



This is a detail drawing showing all dimensions for the construction of the "Towser tickler." Note how the seven brushes attach to central arch. The three arches are built to permit covering with a cloth, making it a simpler task for dog to find his way through the opening. The brushes are of the type having wire bristles set in rubber so they will give when the canine rubs against them.



The base of the scratcher is 36 in. long. The device should be built about the actual height of the animal at the shoulders. The floor of the base is covered with canvas or a rubber mat to allow a good footing when scratching is taking place.

ALL normal dogs have three major interests; eating, sleeping and scratching. In the case of many dogs, the scratching comes first. So, in order to protect upholstery, beds, shrubbery and other objects used for the purpose, a highly efficient scratcher can be devised. It consists of seven wire hair brushes securely fastened under a wooden arch through which the pup passes for treatment.

In order to accustom dogs to the device, it's a good idea to place it at a small opening provided for them in the back fence or some other exit around the home. The "tickler" is equally effective used in either direction.

The size of your dog will of course determine the dimensions of the arch. It should be built about the actual height of the animal at the shoulders. When the brushes are installed, he will then receive a thorough scratching.

Build the base about 36 in. long out of ordinary ¾" material and erect the central arch. The brushes are attached with two screws, as shown in detail drawing above. Brushes may be purchased in the ten cent store for a dime apiece. Have the wire bristles set in rubber so that they "give" easily. The end arches are the same dimensions as the central arch and only necessary if a cloth covering is to be used. The covering makes it simpler for the dog to find his way through the arch.

High Speed WASH BOX for Cut Films

THE cut films now so widely used by amateur photographers are easily handled in small trays except for the final washing operation. You cannot let them float around at random in a tray with water running in it, as they are too stiff and will scratch each other with their sharp corners. Yet cut films are, unfortunately, not stiff enough to stand straight in the ordinary plate washing box.

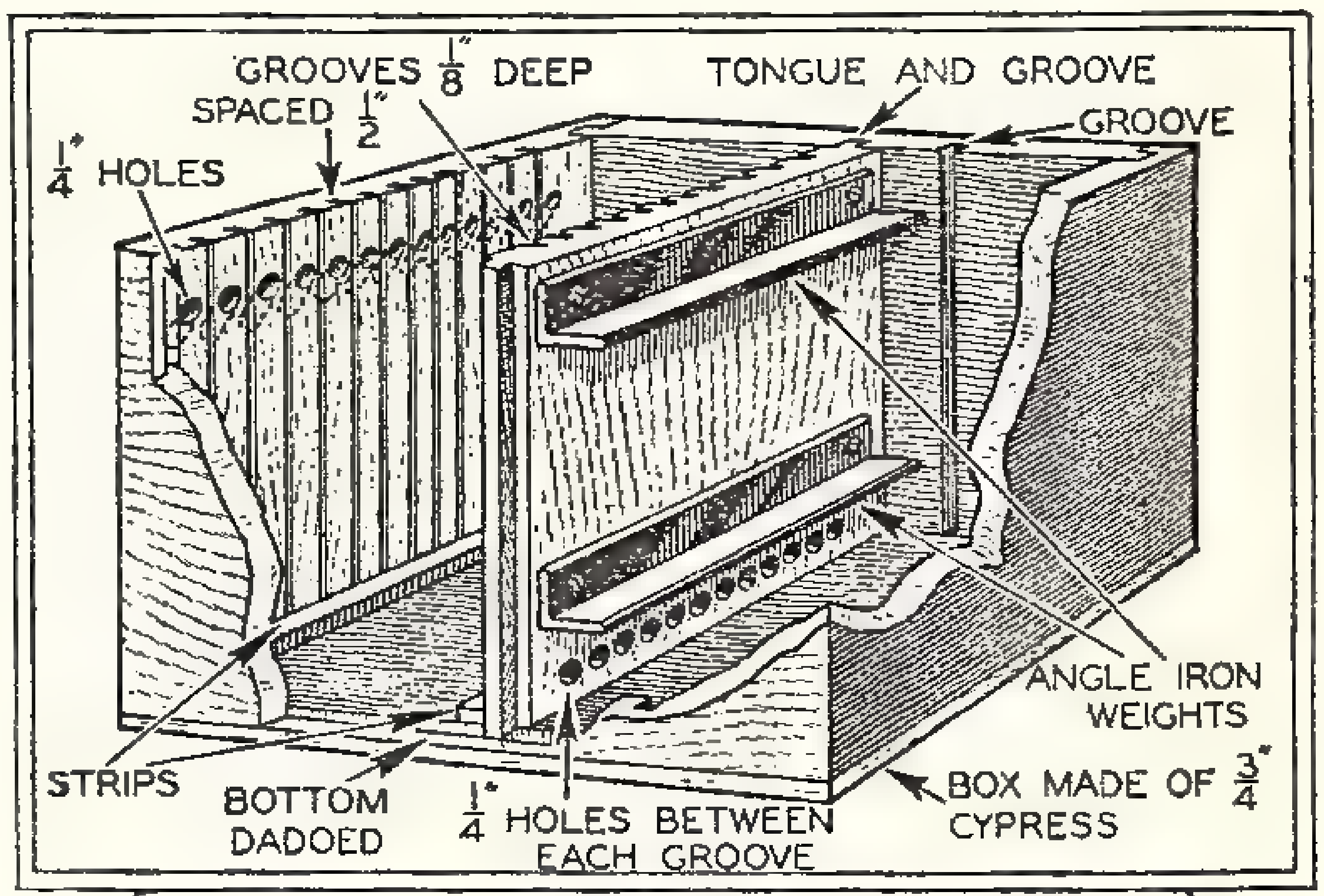
A solution of the problem is to build yourself a special cut film washing box. In the box illustrated here, the films are held in grooves, each getting the full effect of the flow of water. It is fitted with a removable partition and washes either 5x7 or 9x12 centimeter cut films.

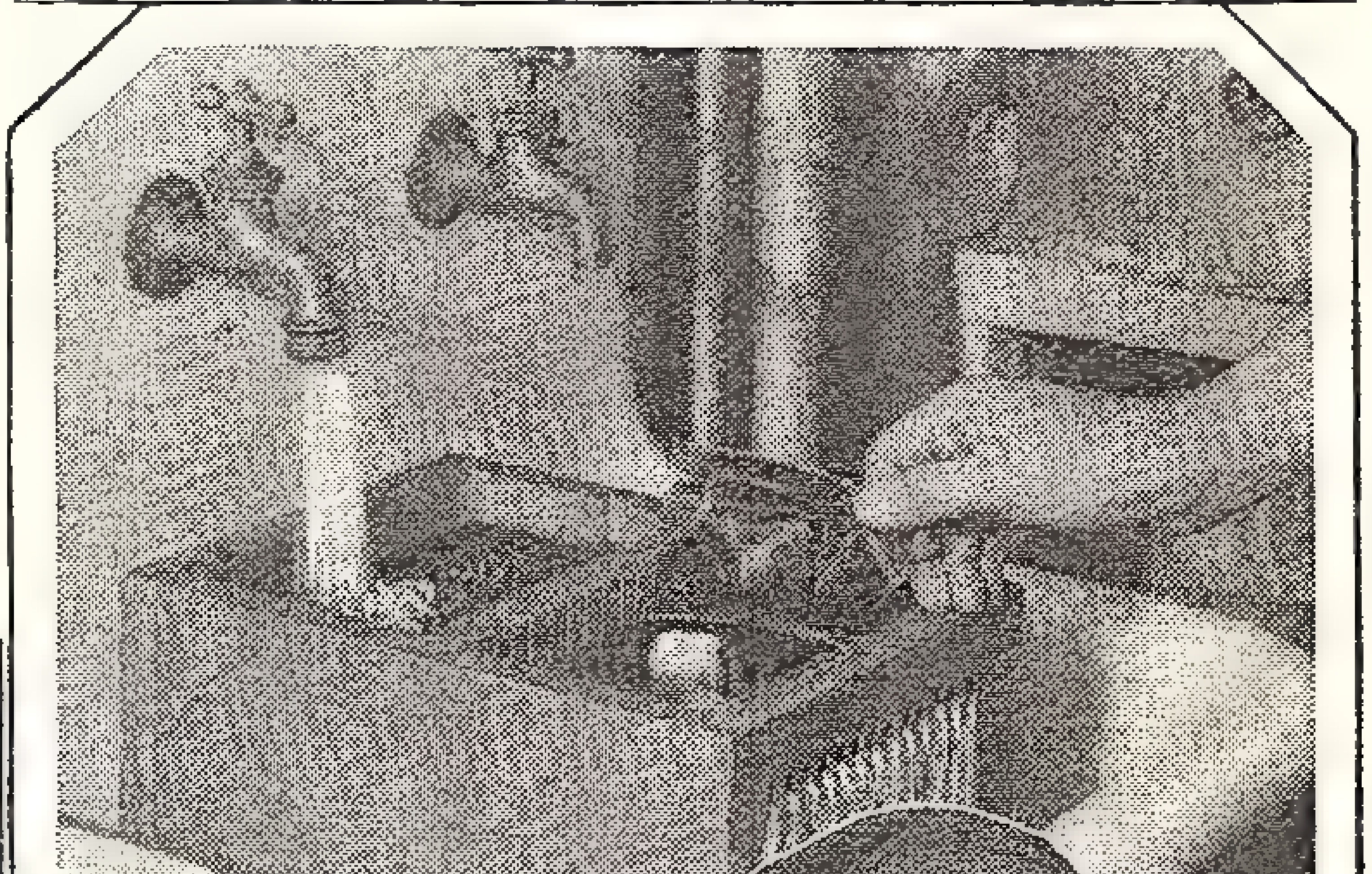
A row of ¼" holes is drilled in the base of the partition, through which the water flows into the film compartment. The overflow holes also are made with a ¼" drill working at an angle upward toward the inside of the box.

With the flow of water downward through these holes, the inside opening is not completely covered. Any scum or dust on the surface of the water is immediately drawn off. Horizontal holes would not produce this effect. The grooves should be about ⅛" deep. Place a small square strip along the bottom of each row of grooves in the ends, with the bottom dadoed to set in ¼".

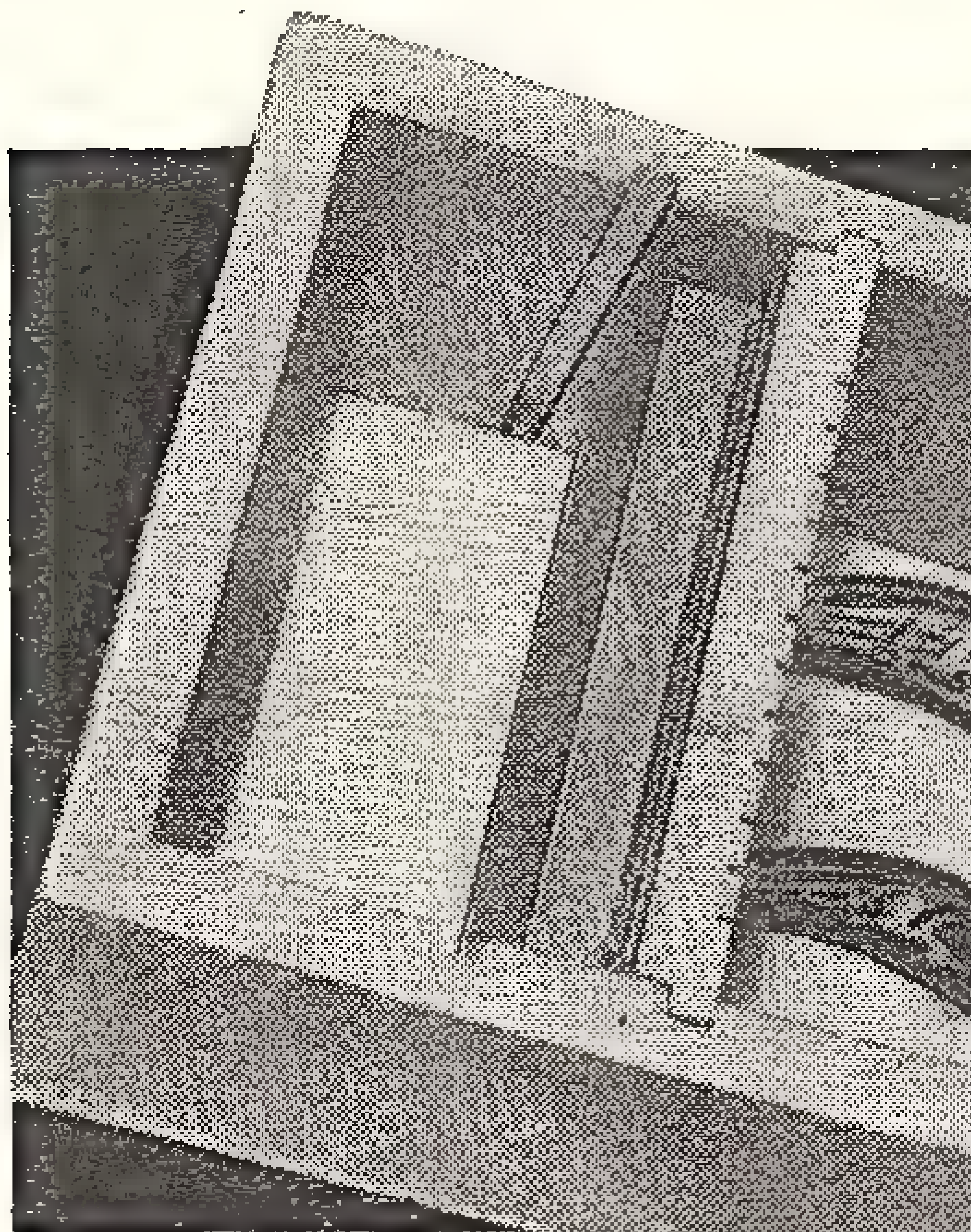
The box was put together with casein glue and then waterproofed with spar varnish diluted fifty-fifty with turpentine. The cypress, being porous, soaks up this mixture almost as fast as you can put it on and that is exactly what is desired, because waterproofing is the object of the treatment. Apply one liberal coating and keep going over it for about half an hour. Then let it stand for twenty-four hours and repeat the treatment.

If you use a partition in your box, be sure and weight it down, otherwise it will bob up when water runs through.



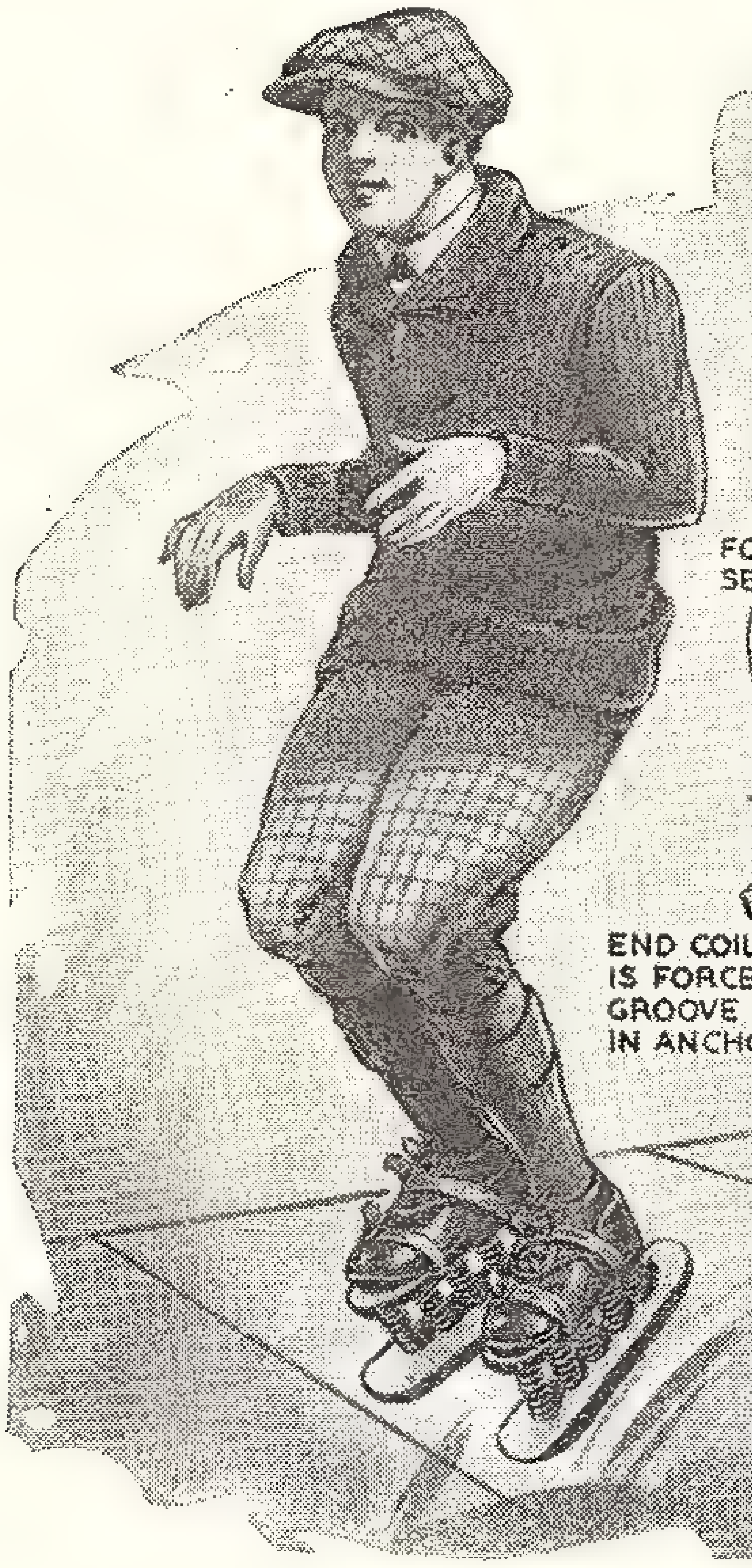


Construction details are given in drawing at top. In the photo above, note how easily ¼" holes carry away heavy flow of water. Collection of surface dust is prevented.

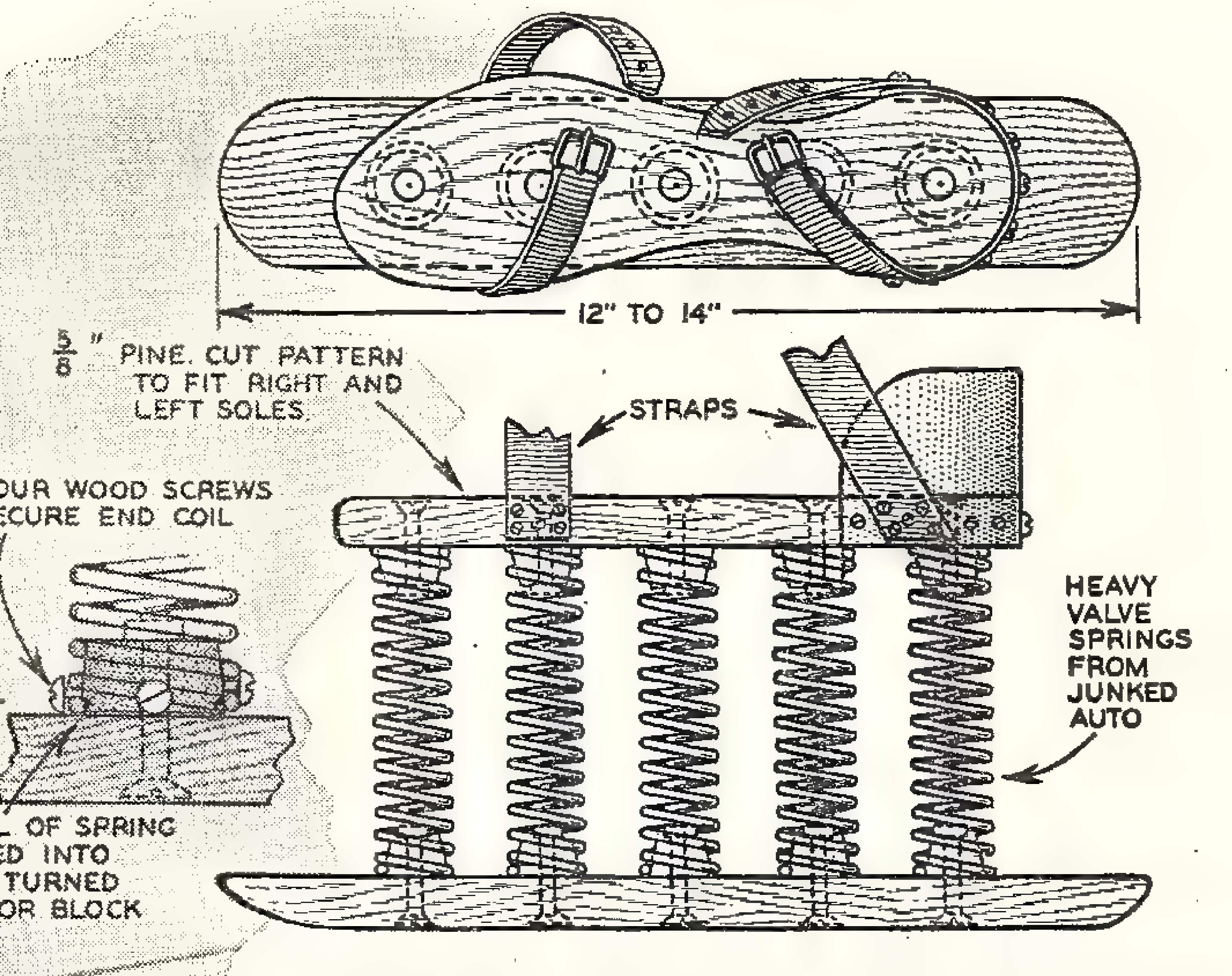


The photo directly above is a top view of the wash box with two cut films in place ready for the flow of water. Their natural springiness keeps them in the grooves. The attached iron bars are a means of holding the partition in place when water flows through the box. The photo at right shows the ¼" holes drilled in the partition and end boards. The partition can be removed and inserted in groove further back to take larger size films. Holes of partition board are in the bottom.

New Sport—Hop on "Kangaroo Sandals"



Hop around on kangaroo shoes in manner shown here.


12" TO 14"
5/8" PINE. CUT PATTERN TO FIT RIGHT AND LEFT SOLES.
STRAPS
FOUR WOOD SCREWS SECURE END COIL
HEAVY VALVE SPRINGS FROM JUNKED AUTO
END COIL OF SPRING IS FORCED INTO GROOVE TURNED IN ANCHOR BLOCK

Chief constructional details are set forth here. To prevent buckling, secure the ends of the springs firmly around the anchor block. Heel plate is made from metal or fibre.

THESE "Kangaroo Shoes" are an offshoot of the "Pogo Stick," although much more thrilling to operate. When one acquires the knack of wearing them, he is bound to be the envy of the neighborhood youngsters.

Most of the construction details may be gleaned from the illustrations above but a few points should be made clear. The selection of suitable springs is very essential. Use five strong and husky ones from the larger type automobiles. If you weigh over 125 pounds, use six springs. The junk dealer should be able to supply a set of these.

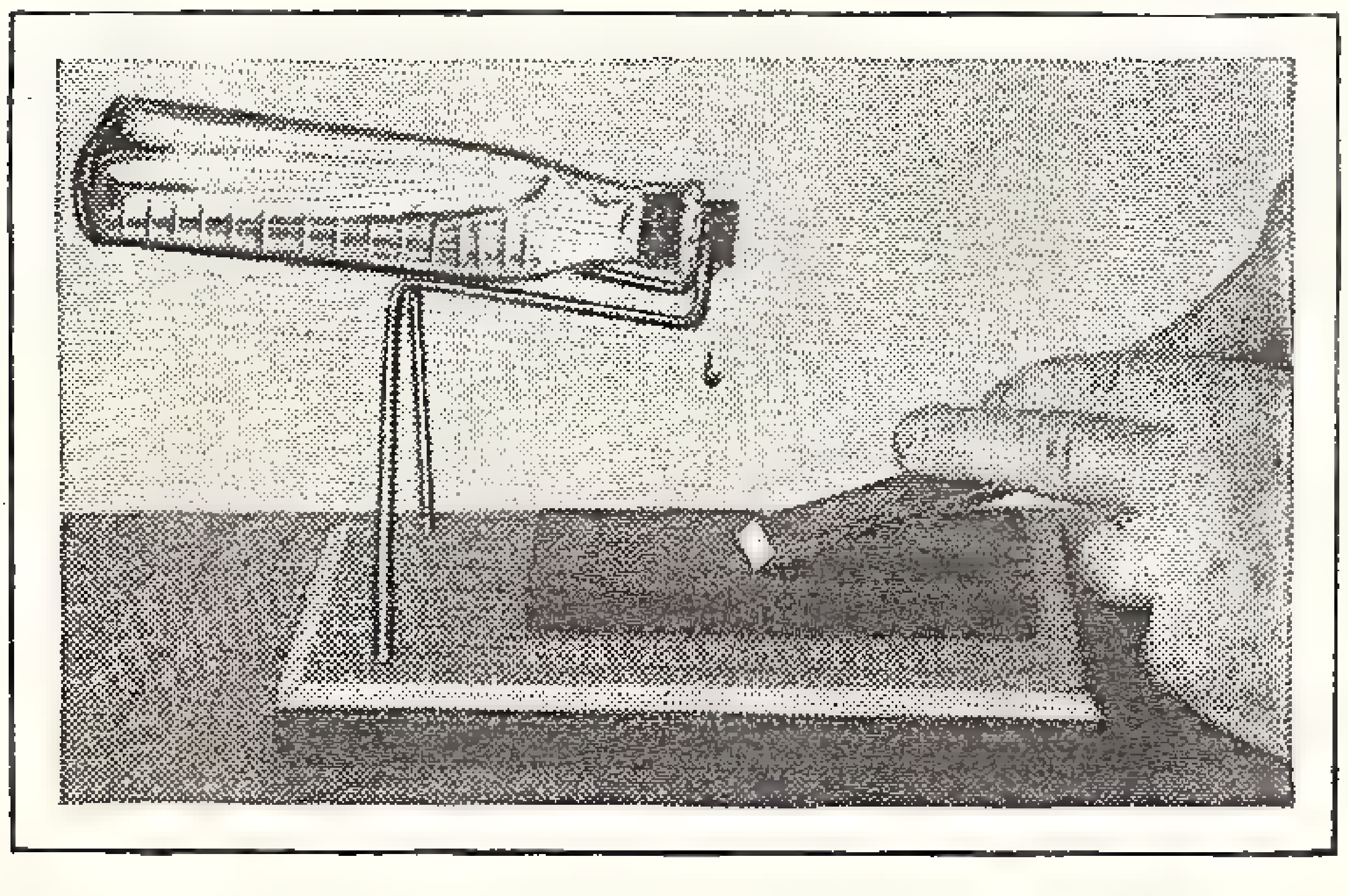
Take especial note of how the springs are attached to the top and bottom boards. Spring retainers are turned of hardwood with a groove at the end next to the boards. The springs are forcefully driven over the high point and into the grooves. Then four wood-screws hold the end coils in place. Be sure that the ends of the springs are held rigidly against the boards, otherwise the ends will cock up and the springs buckle in the middle.

Walking on the "Kangaroo Shoes"

It takes time to learn to walk on these shoes. At first try, they will feel like lumps of jelly under the feet, but after a little practice one can balance on them as easily as a wire-walker balances on a wire. After the familarizing process is over, start performing tricks; particularly hopping around like a kangaroo. If a user's weight is "in tune" with the natural vibration of the springs, the long hops possible are amazing. Be sure to practice on a grassy lawn until the knack of using the shoes is acquired, as one is bound to take a few falls in the beginning.

Oilstone Has Dropper Attachment

A USEFUL addition to the home workbench is this clever arrangement of an oilstone with dropper attachment. It is constructed for the purpose of assuring an ever ready lubricant for your oilstone. The bottle holder is made of wire, bent in the manner shown in photo below. The "cork" is made of wood with a small hole bored through it so that when the bottle is laid down in a horizontal position the contents can escape drop by drop. The lubricant container, returning to a vertical position, becomes airtight and closed.



Bottle drops lubricant on stone while you sharpen tool.

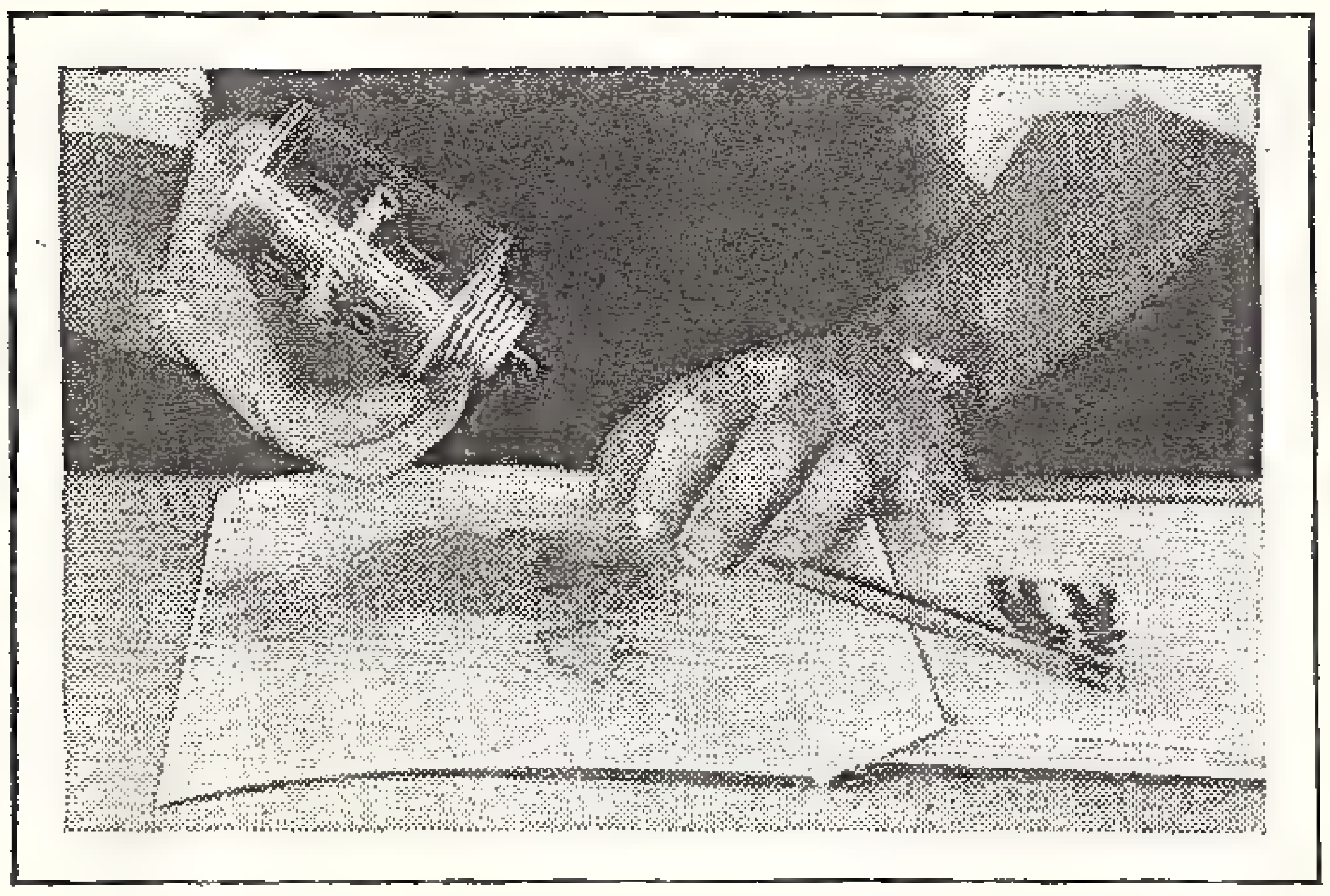
Chassis of an Old Car Makes Novel Swing for the Children

THE funny looking contraption in the photo at right sees plenty of service whenever children gather to play. It is a cut-down chassis of an old automobile, held by four chains which attach to an overhead iron pole. The youngsters pile in the seats in great numbers while a few, who are delegated to furnish the power, push the novel swing back and forth. It offers pleasure to a much greater number of children than the ordinary swing.

Tracings Utilize Lighter Fluid

YOU can fool your friends and make them think you are really a first class artist by following the instructions given here. Attractive drawings or tracings of photographs and sketches may be made to appear like the real thing.

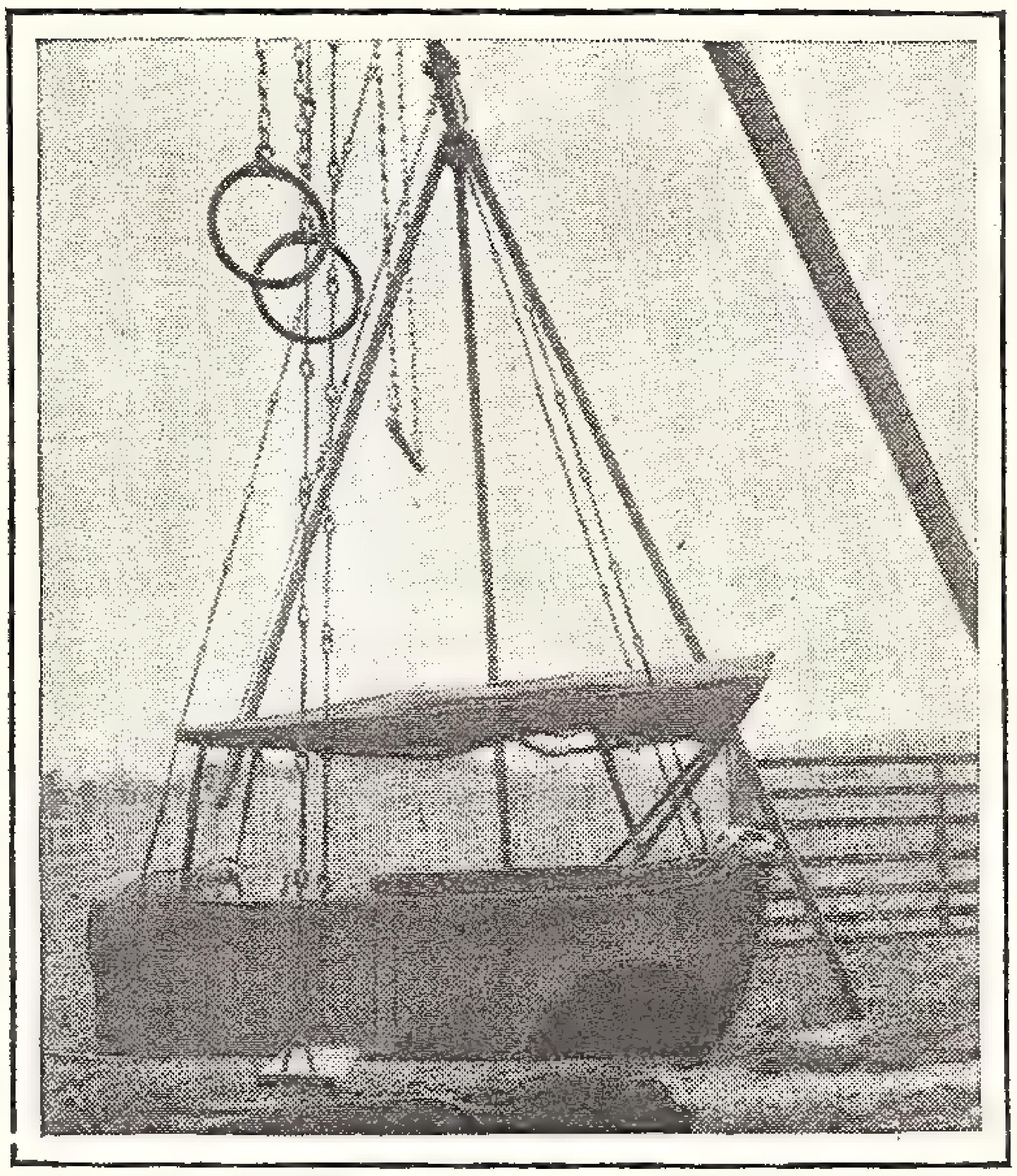
Moisten the surface of a piece of tracing paper, which may be heavy drawing paper if desired, with a few drops of cigar lighter fluid. This makes the paper very transparent. The tracing is made with an ordinary pencil, and, due to the lighter fluid which acts as a lubricant, the pencil tracings will show up unusually dark, as if one were tracing with pen and ink. Although a bit slower, equal success may be had with pen and drawing ink tracings. The lighter fluid will evaporate in several minutes, leaving a clear, clean tracing.



Attractive drawings or tracings of photographs and sketches are possible with the use of a few drops of cigar lighter fluid. Spread on the paper, it makes it very transparent.

Invisible Glass for Show Windows

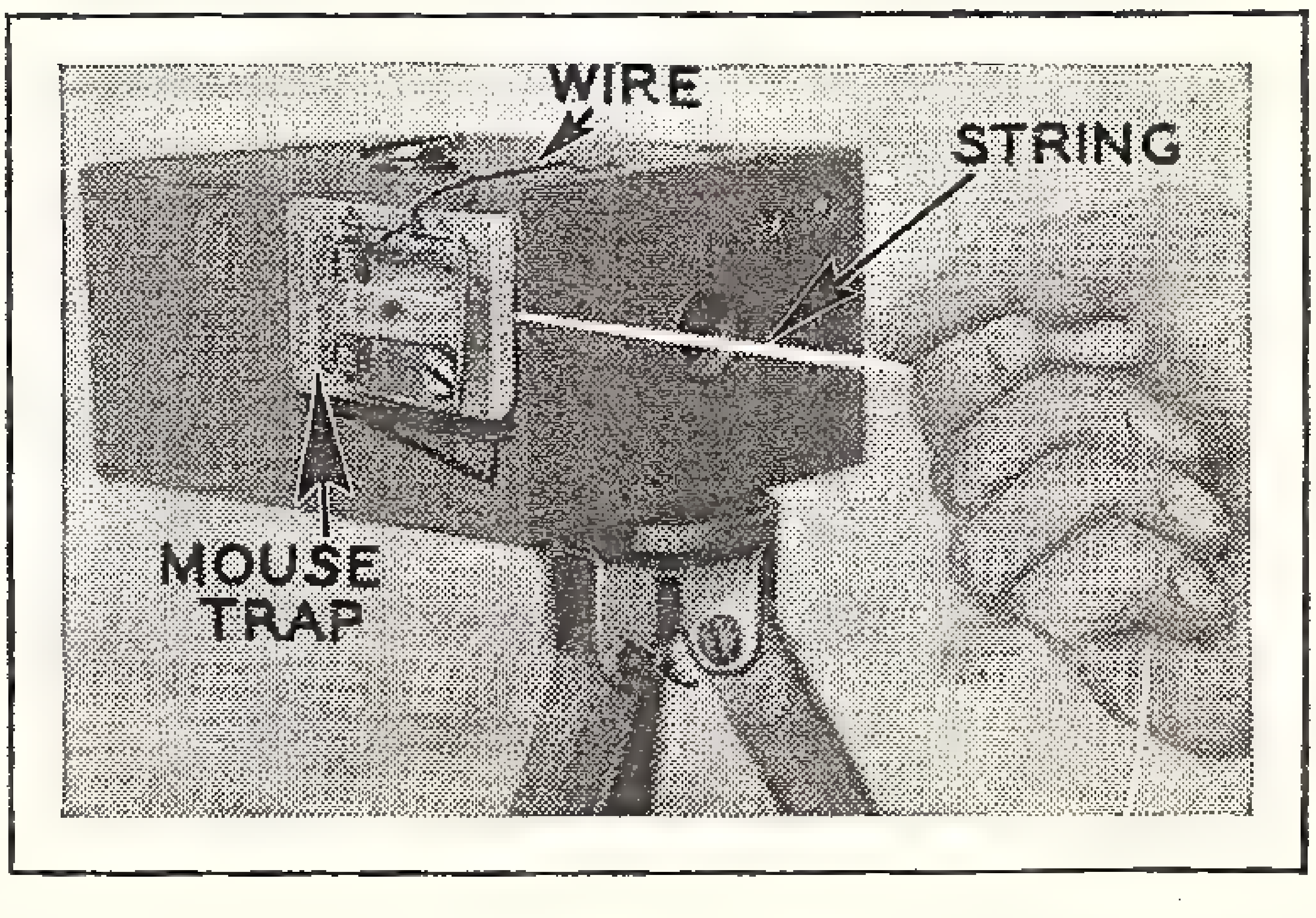
INVISIBLE glass for store show windows, for use in front of paintings in art galleries and for other places where protection is necessary but must be unnoticeable has been recently invented. The secret is to curve the surface of the glass pane so that reflections of all objects in front of it are not seen. Freed from these reflections, the glass itself becomes virtually invisible. The precise shapes which are best depend somewhat on circumstances but usually they are parabolic, not unlike the reflecting mirrors used in searchlights. Edges of the glass, as well as top, must of course be concealed in the mounting.



Many children may ride on this improvised swing at one time. The cut-down chassis of an old automobile is used which hangs by four chains from an overhead iron pole.

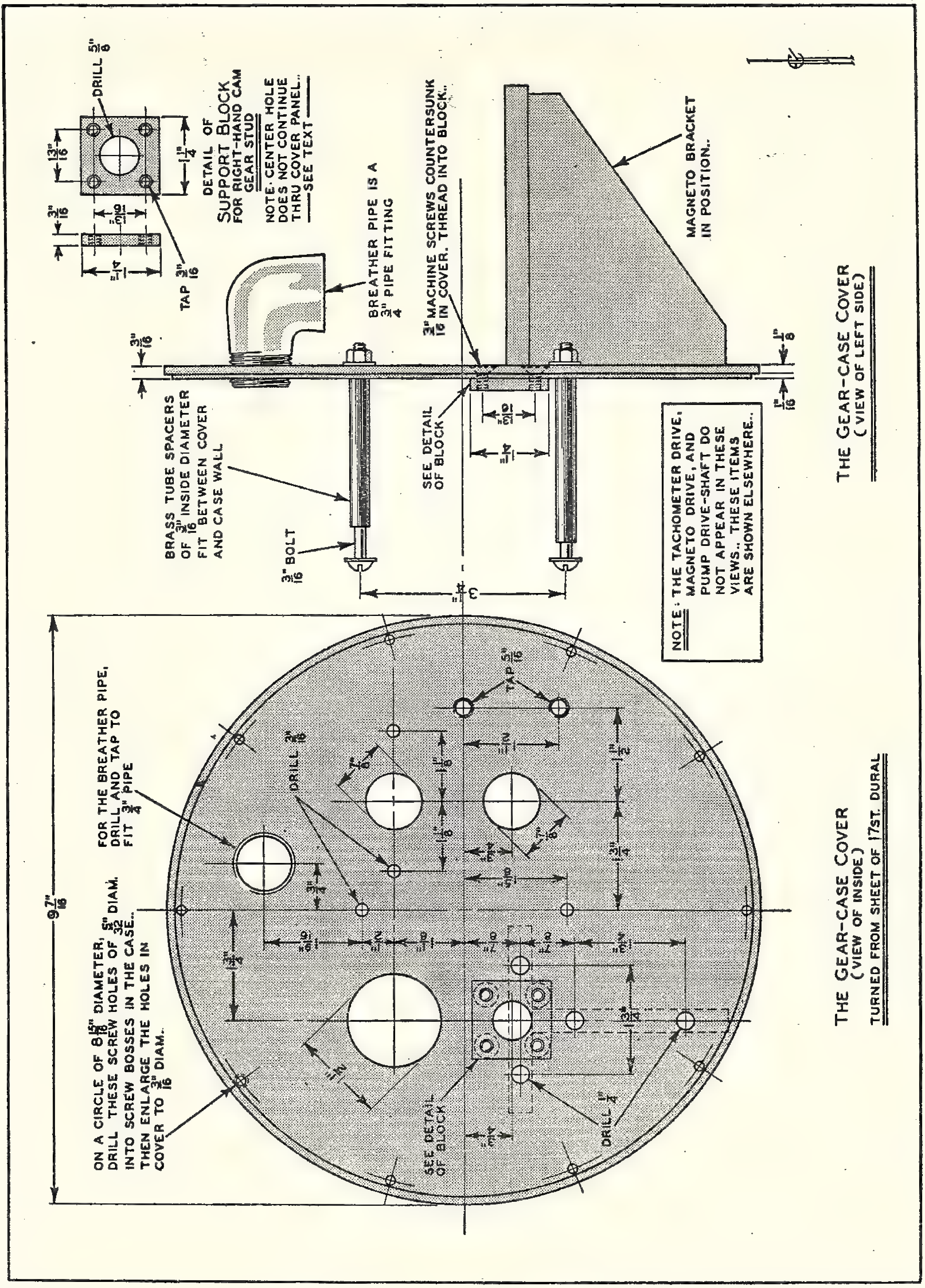
Mouse-trap Release Takes "Snap"

TO MAKE this demountable, automatic trigger release for your box camera, use an ordinary mouse-trap, a small length of copper wire and a piece of string. With trap sprung, remove the trigger trip and remount at the opposite end as shown in the photo below. Cut a 2½" piece of copper wire, fastening one end to the wire "jaw" of the trap, and looping the other end over the camera trigger. Then drill a small hole directly underneath the trigger-trip, and run a length of string through the hole, tying same to the "tongue." To set the release, lift the spring and rest it on trigger-trip. Now get off to the proper distance and, when ready, pull the string. Run the string down the tripod leg so that it is out of range of the lens.

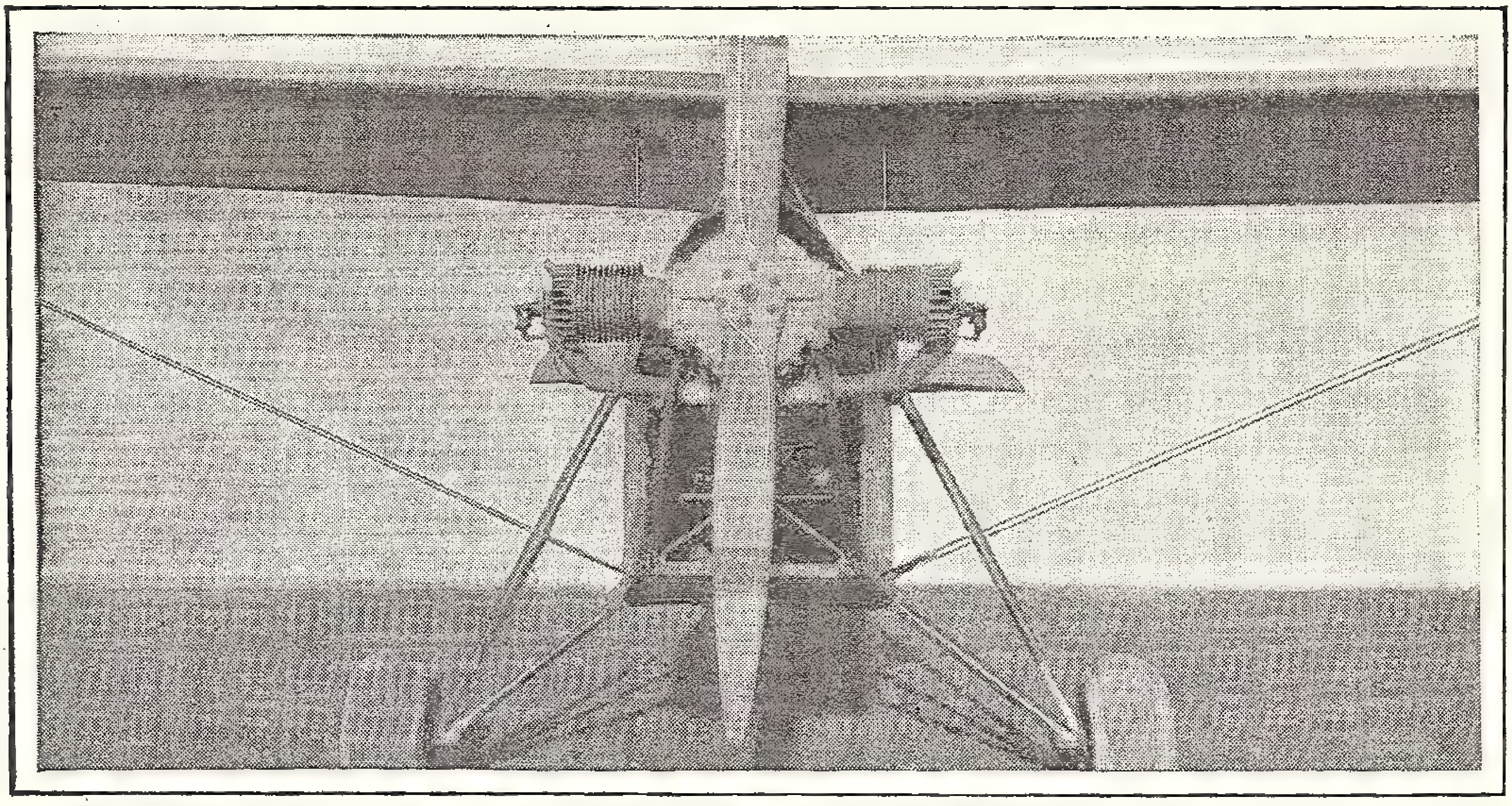


You may take your own picture with the device shown above. It consists of a mouse-trap release which trips the camera trigger and snaps shutter when you pull the string.

Gear Case Cover of Dural; Breather Pipe, Magneto Bracket Also Shown


DRILL 5/8"
13/16"
1 1/4"
3/16"
13/16"
1 1/4"
TAP 3/16"
DETAIL OF SUPPORT BLOCK FOR RIGHT-HAND CAM GEAR STUD
NOTE: CENTER HOLE DOES NOT CONTINUE THRU COVER PANEL.. —SEE TEXT—
BREATHER PIPE IS A 3/4" PIPE FITTING
3/16" MACHINE SCREWS COUNTERSUNK IN COVER. THREAD INTO BLOCK..
MAGNETO BRACKET IN POSITION..
3/16"
1/8"
1/16"
BRASS TUBE SPACERS OF 3/16" INSIDE DIAMETER FIT BETWEEN COVER AND CASE WALL
3/16" BOLT
SEE DETAIL OF BLOCK
13/16"
1 1/4"
3 1/4"
NOTE: THE TACHOMETER DRIVE, MAGNETO DRIVE, AND PUMP DRIVE-SHAFT DO NOT APPEAR IN THESE VIEWS.. THESE ITEMS ARE SHOWN ELSEWHERE..
THE GEAR-CASE COVER (VIEW OF LEFT SIDE)
FOR THE BREATHER PIPE, DRILL AND TAP TO FIT 3/4" PIPE
ON A CIRCLE OF 8 15/16" DIAMETER, DRILL THESE SCREW HOLES OF 5/32" DIAM. INTO SCREW BOSSES IN THE CASE.. THEN ENLARGE THE HOLES IN COVER TO 3/16" DIAM.
9 7/16"
DRILL 3/16"
TAP 5/16"
7/16"
1 1/2"
1 1/8"
3/4"
1 1/2"
1 3/4"
1 3/4"
SEE DETAIL OF BLOCK
DRILL 1/4"
THE GEAR-CASE COVER (VIEW OF INSIDE) TURNED FROM SHEET OF 17ST. DURAL

The gear case cover is made from a sheet of 17ST Dural, which is furnished with the castings if you buy them from Long. This drawing shows how the case is drilled for breather pipe, tach, magneto, and oil pump drives, but installation of these latter units is shown on a separate drawing. Study the text closely when working out this unit, for the author gives you useful pointers out of his own experience which will greatly simplify the building process. Give the job the care you would bestow on any fine piece of work, and you'll be delighted with the results.



The Harlequin motor mounted in Les Long's home built Parasol monoplane. The aircraft inspector in Oregon, Long's home state, has placed his seal of approval on this nifty motor job, describing it as one of the best he has ever seen.

The LONG HARLEQUIN MOTOR

by LES LONG

Here's the final installment of Les Long's story on building a low-cost, dependable light airplane power plant from motorcycle stock parts. She's a honey, and you can build her on a pocketbook that's nearly flat.

NOW we're ready to make up the gear case cover from the sheet of 17ST Dural furnished with the castings. Turn out a disc a trifle larger than the outside of the rear end of the cam case. Turn the rabbet to fit the one already turned on the casting. They should fit snugly the same as those at the center line of the main case. Note the drawing of the cover carefully and you will understand the positions of the various holes. You can scribe center lines at right angles and lay the cover off with a rule, or it is much simpler to lay the blueprint directly on the cover and prick the centers for all the holes through it. It is best not to drill the holes for the pump shaft and tach drive bushings full size at first. Drill them say ½" and then lay the cover in place and see if they are going to fit. If not, work them till they do.

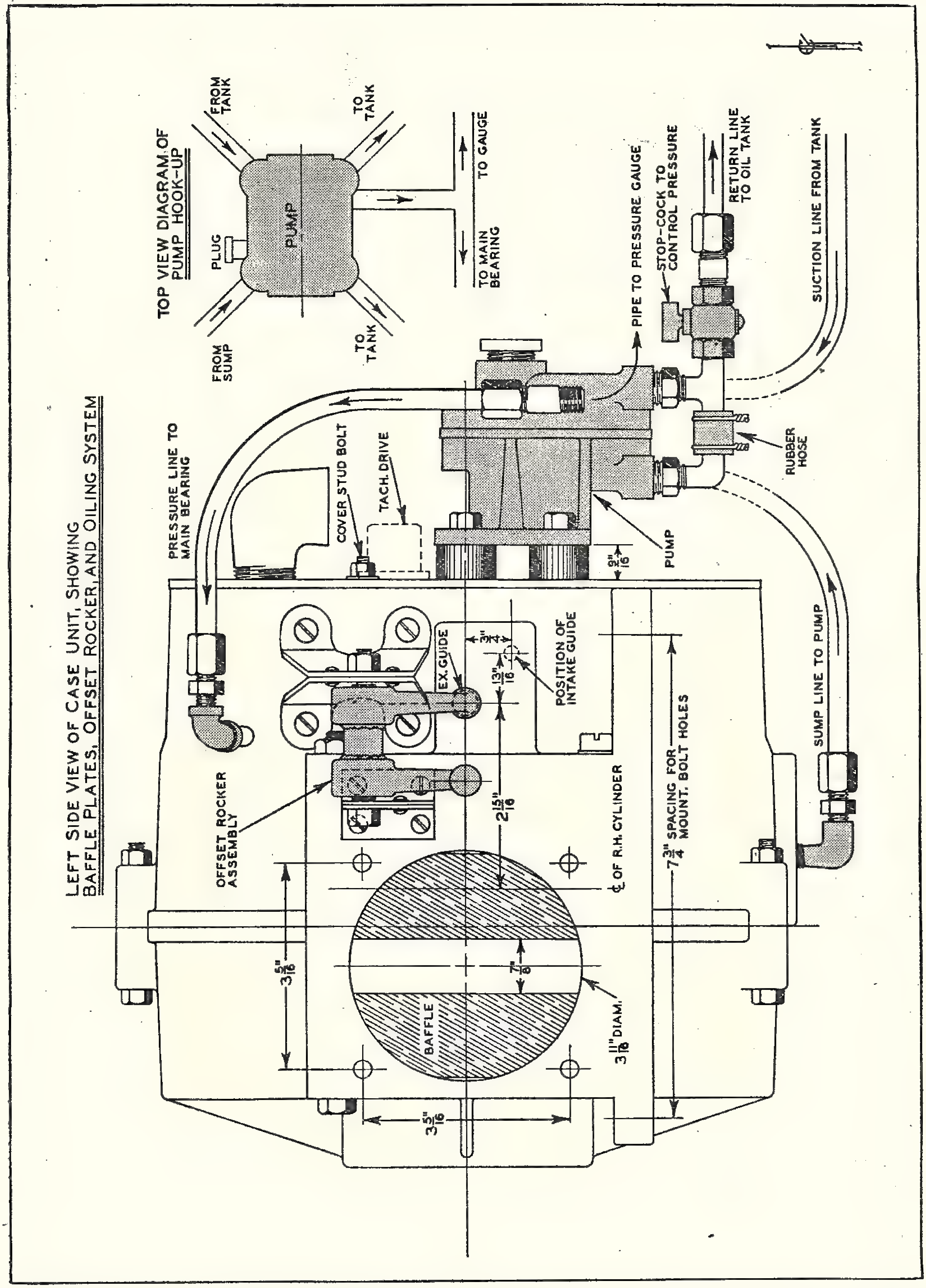
You will notice on the drawings a piece of 1¼" by 1¼" by 3/16" Dural screwed to the cover on the right hand side. This is to support the right hand cam stud. The best way to locate this is to put a touch of paint on the end of the stud and then drop the cover in place. The paint will show where to put the supporting block so that it will fit without a chance of binding. The slightest error otherwise would make it impossible to get the cover on, as the stud must fit snugly in the hole in the little block. With this done you can look right down through the hole for the left hand gear arrangement and see that it is in line.

Make up the tach drive bushing and the pump shaft bushing of bronze as shown. The nuts used are ordinary nuts sawed in two. Make up the tach drive shaft and drive it tightly in its gear, which is the regular Harley shaft or breather gear. The entire tachometer assembly should be put in place and held by the retaining strap shown. The pump drive shaft is now made up. Use N. S. shafting and make it exactly to the dimensions given. The first thing to do is to drill out the outer half

BLUEPRINTS FOR THE HARLEQUIN MOTOR

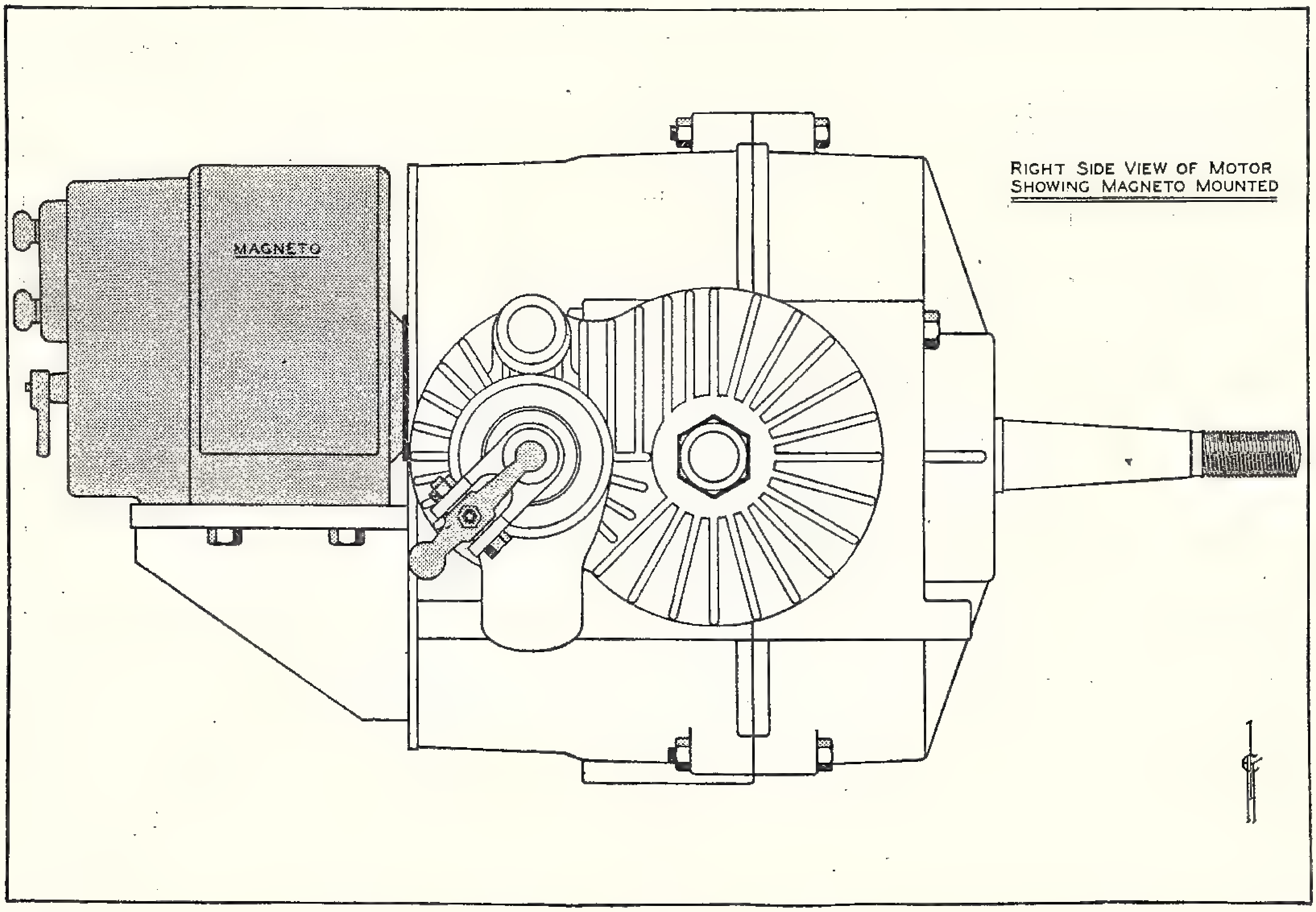
A complete set of full-size blueprints on the Harlequin motor is available from Modern Mechanix and Inventions Blueprint Department at $5 per set. These blueprints are made from the original drawings which illustrate this article, but they show practically all the parts in actual size, as cannot be done in the small confines of a magazine page. One of the most beautiful and complete sets of drawings we have ever seen. Address the Blueprint Department at 529 South Seventh Street, Minneapolis, Minn.

Oiling System Well Shown in This Drawing; Also Offset Rocker Assembly


LEFT SIDE VIEW OF CASE UNIT, SHOWING BAFFLE PLATES, OFFSET ROCKER, AND OILING SYSTEM
TOP VIEW DIAGRAM OF PUMP HOOK-UP
FROM TANK
TO TANK
TO GAUGE
TO MAIN BEARING
PLUG
PUMP
FROM SUMP
TO TANK
PIPE TO PRESSURE GAUGE
STOP-COCK TO CONTROL PRESSURE
RETURN LINE TO OIL TANK
SUCTION LINE FROM TANK
RUBBER HOSE
PUMP
PRESSURE LINE TO MAIN BEARING
COVER STUD BOLT
TACH. DRIVE
9/16"
EX. GUIDE
3/4"
13/16"
POSITION OF INTAKE GUIDE
SUMP LINE TO PUMP
2 15/16"
OFFSET ROCKER ASSEMBLY
℄ OF R.H. CYLINDER
7 3/4" SPACING FOR MOUNT. BOLT HOLES
3 5/16"
7/8"
BAFFLE
3 11/16" DIAM.
3 5/16"

The oil lines may be fully understood through this plan. Do not allow sharp bends in the tubing; 5/16 in. line is used throughout, with the usual fittings. Note the directness of lines to various parts of the motor. Use great care in fitting the offset rocker assembly into position. This is an unusual feature of the Harlequin and must be assembled with absolute precision. The position of the oil baffles is clearly shown and no difficulty whatever should be experienced with them.

Marvelously Compact, Clean Design of the Harlequin Shown in Side View



Compact arrangement of magneto in relation to motor shown in this outline view of the right side of the engine.

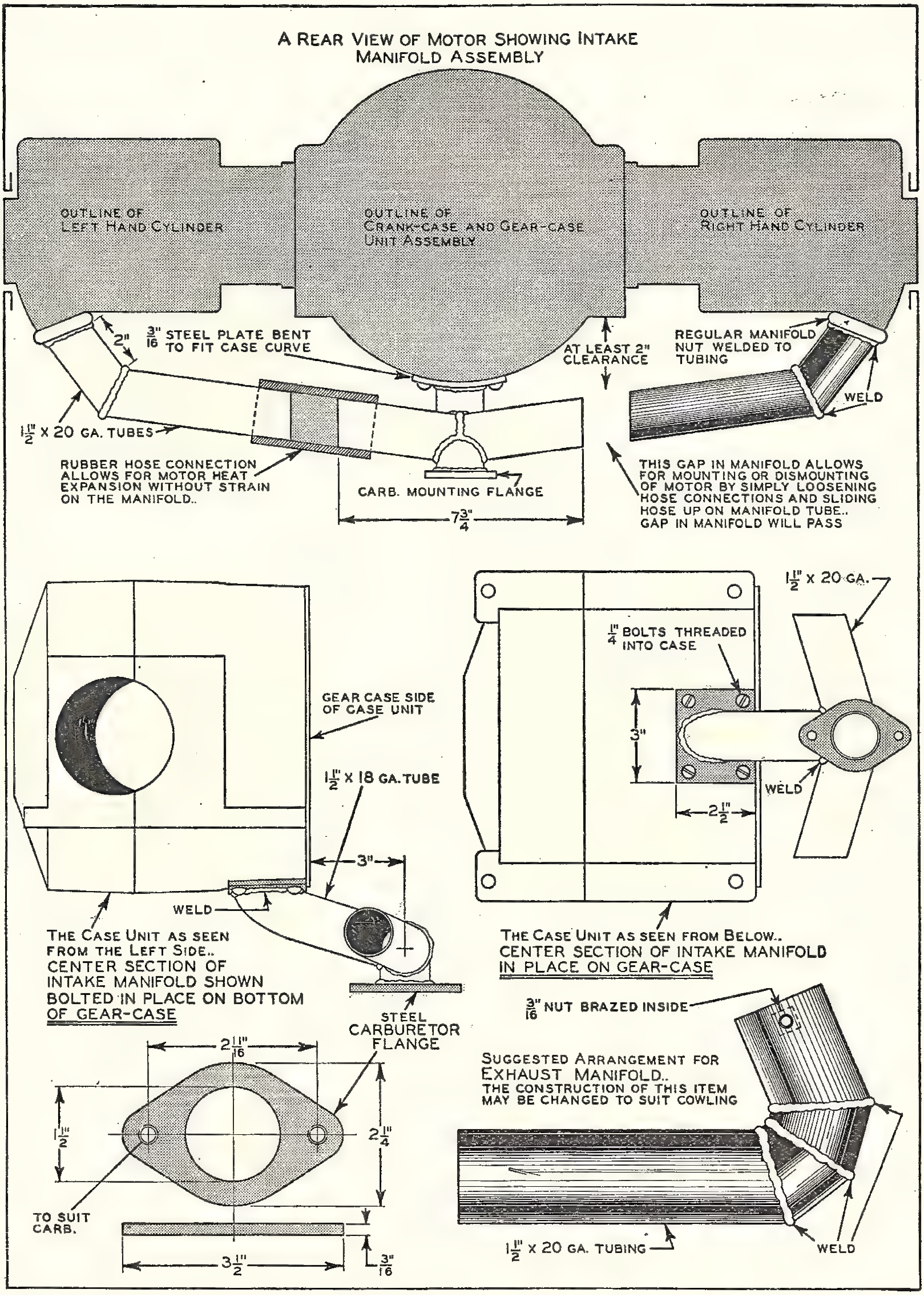
of the bushing in the cam gear. Simply take a ⅝" drill and run it a trifle over half-way through the gear, thus removing that part of the bronze bushing. Turn the end of the shafting so that it makes a very tight drive fit in the gear. Drive it in and then chuck up the gear and protruding shaft and finish the turning. This is so the shaft will be true with the gear. Check the gear carefully, both for center and for wobble. You will notice that there are two places where the shaft is square. Do this with a file, keeping these parts nice and truly square. It should be plain that this left hand cam gear bears partly on the regular cam stud and partly in the bushing in the cover.

Tap the hole for the breather. This is a plain ¾" pipe elbow. Make up the magneto bracket of ⅜" aluminum stock as shown and bolt it on. You will notice that we use a much simplified magneto drive arrangement, which is the reason we can use such a small and neat bracket. You may use nearly any type magneto you prefer. We use mostly Simms and Splitdorf. The type used will govern the style of the little gear extension fitting shown. The one shown is for the Splitdorf. The idea is to extend the gear far enough through the 1½" hole so that it will mesh properly with the R. H. cam gear. The end of the magneto must butt squarely up against the cover plate, with a felt washer between the two to keep it oil tight. If the magneto happens to have a rounded end, use an aluminum washer as shown. You will have to cut a taper hole in the extension fitting to fit the magneto shaft, and also two key seats, one for the shaft and one for the gear. You can make these with a file. After the magneto is fitted with its gear, which is also the regular Harley shaft gear, set it on the bracket and push the gear through till the two gears mesh properly. Then locate the holes on the bracket for drilling the magneto bolt holes. If the gears seem to bind, shim the magneto up slightly. The magneto used is a regular 4-cylinder type and of course runs at engine speed. This makes very easy starting. You will notice that there are no couplings, shafts, impulse couplings or other mess about this arrangement.

The drawings show two 3/16" holes in both the cover and gear case, one above and the other below the center. These are for studs to stiffen the cover plate. Simply cut two pieces of tubing having a 3/16" hole that will just reach from the case wall out to the cover. When making final assembly put these in place and slip a 3/16" bolt through, keeping the heads inside the crank case and the nuts on the outside of cover.

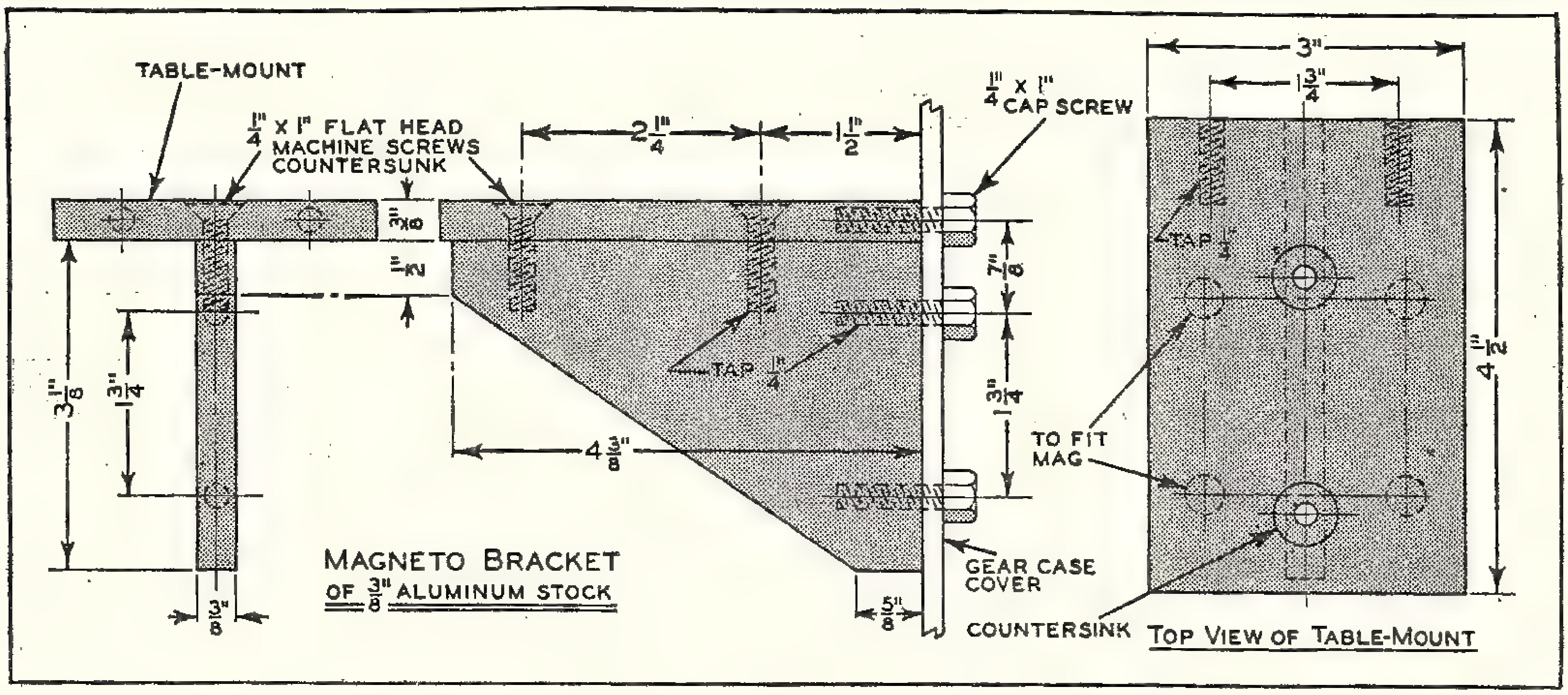
We can now drill the ring of holes to take the screws holding the cover on. Drop the cam gear having the pump shaft on the L.H. stud. Tighten the pump shaft bushing up snugly and drop the cover in

Ingenious Manifold Arrangement Makes Simple Job of Dismounting


A REAR VIEW OF MOTOR SHOWING INTAKE MANIFOLD ASSEMBLY
OUTLINE OF LEFT HAND CYLINDER
OUTLINE OF CRANK-CASE AND GEAR-CASE UNIT ASSEMBLY
OUTLINE OF RIGHT HAND CYLINDER
2"
3/16" STEEL PLATE BENT TO FIT CASE CURVE
AT LEAST 2" CLEARANCE
REGULAR MANIFOLD NUT WELDED TO TUBING
WELD
1 1/2" X 20 GA. TUBES
RUBBER HOSE CONNECTION ALLOWS FOR MOTOR HEAT EXPANSION WITHOUT STRAIN ON THE MANIFOLD..
CARB. MOUNTING FLANGE
7 3/4"
THIS GAP IN MANIFOLD ALLOWS FOR MOUNTING OR DISMOUNTING OF MOTOR BY SIMPLY LOOSENING HOSE CONNECTIONS AND SLIDING HOSE UP ON MANIFOLD TUBE.. GAP IN MANIFOLD WILL PASS
1 1/2" X 20 GA.
1/4" BOLTS THREADED INTO CASE
3"
WELD
2 1/2"
GEAR CASE SIDE OF CASE UNIT
1 1/2" X 18 GA. TUBE
3"
WELD
THE CASE UNIT AS SEEN FROM THE LEFT SIDE.. CENTER SECTION OF INTAKE MANIFOLD SHOWN BOLTED IN PLACE ON BOTTOM OF GEAR-CASE
STEEL CARBURETOR FLANGE
THE CASE UNIT AS SEEN FROM BELOW.. CENTER SECTION OF INTAKE MANIFOLD IN PLACE ON GEAR-CASE
3/16" NUT BRAZED INSIDE
SUGGESTED ARRANGEMENT FOR EXHAUST MANIFOLD.. THE CONSTRUCTION OF THIS ITEM MAY BE CHANGED TO SUIT COWLING
2 11/16"
1 1/2"
2 1/4"
TO SUIT CARB.
3 1/2"
3/16"
1 1/2" X 20 GA. TUBING
WELD

The principal point of interest in the design of this manifold arrangement is that in mounting or dismounting the motor, all that is necessary is to disconnect the two rubber hose connections and the gap left in the manifold will allow the motor bearers to pass easily. The drawing is self-explanatory. Exhaust manifold arrangement may be changed by the individual to conform to style of cowling chosen.

Direct Geared Drive to Magneto Eliminates Need for Shafting, Couplings



Magneto bracket fits close to case, allowing direct geared drive without complicated arrangements.

place. If with the R.H. stud in its support, the pump shaft doesn't bind, everything is fine. Take it off. All around the gear case, on the outside make pencil marks opposite each screw boss. Replace cover and scribe an 8 15/16" circle. Opposite each of the pencil marks drill down through cover and into the case about 1¼". Use a 5/32" drill. Tap the holes in the case for 3/16" by 24 thread round head screws. Enlarge the holes in the cover to 3/16".

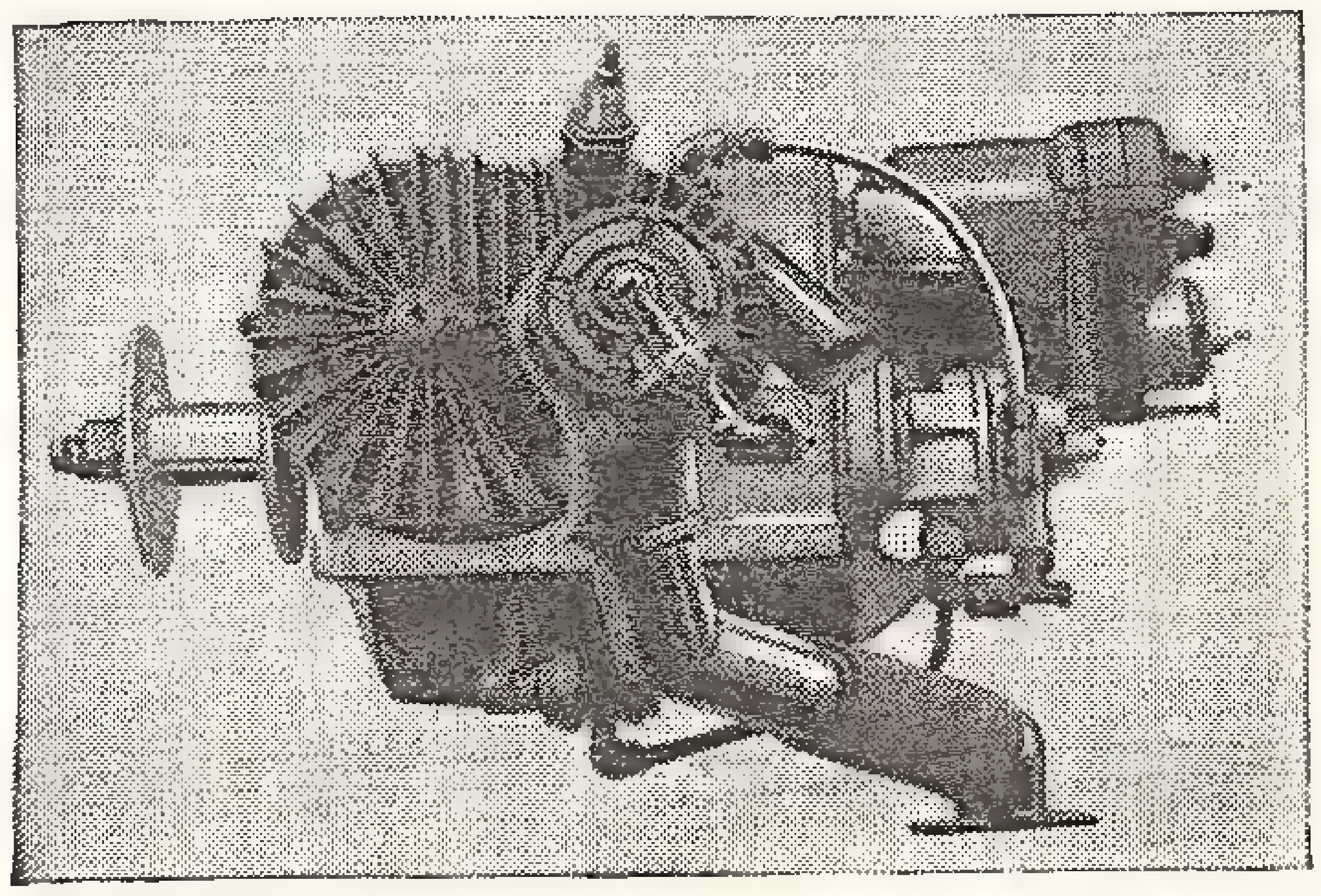
You will see in one of the drawings how the main oil line runs to the rear bearing. Drill a hole approximately in the position shown to pass ⅛" water pipe. Drill so that the pipe will just clear the case wall. Run a long drill down through this hole and drill and tap the bearing boss for the pipe as shown. At this time we will mention a detail that was purposely not mentioned. Where this oil line goes through the bronze bushing a groove about 3/16" wide and 3/32" deep should have been cut in the bushing. Do this with a boring bar. This groove is to carry the oil around the crank shaft so that the hole in the side of the shaft is always open to the oil. The hole in the boss and bushing, the groove, and the hole in the shaft must all register. The distance of all three will be approximately 1 inch back of the front end of the bearing boss. Use a little thought on this. At the top of the ⅛" pipe put an elbow and copper pipe coupling.

The oil baffles may be put in now. They are shown plainly and may be of aluminum, Dural or brass. Fasten them with 3/16" RH machine screws. Using these baffles there is no need for oil rings and the motor gets just the right amount of oil.

And now we come to the gadget that looks bad, but is easy to do. It is the special double oil pump we worked out here. The advantages of a dry sump engine are so many we decided that was what we wanted, so we made it that way. Dry sump engines are lighter, free from smoking when upside-down and have far less head resistance. The pumps are both in one unit. They are made of the regular Chevrolet pump. Get two of them at any wrecking house and with a saw and file trim the mounting bracket off one of them. The regular pump cover is as shown and the two pumps are placed face to face with the plate between them. Each part has its set of gears as usual, but you will notice that on the rear pump, which is the pressure part, the gear with the square hole is bushed so that it fits the squared end of the pump shaft.

This little bushing can be a strip of 20-gauge copper bent around in the hole and sweated in with solder. After the bracket has been sawed off the rear half the regular screw holes must be drilled clear through with a 3/16" drill. Ordinary stove bolts are used for assembling, going through the rear half and into the front half holding all together. Use the regular paper gaskets made for this pump. The pumps are from the older model Chevrolets. There are the regular packing nuts with the pumps. The rear one takes the shaft and is packed in the regular way. The front one is soldered shut as shown and screwed in tight. The pump is put on the cover after the motor is assembled,

(Continued on page 134)

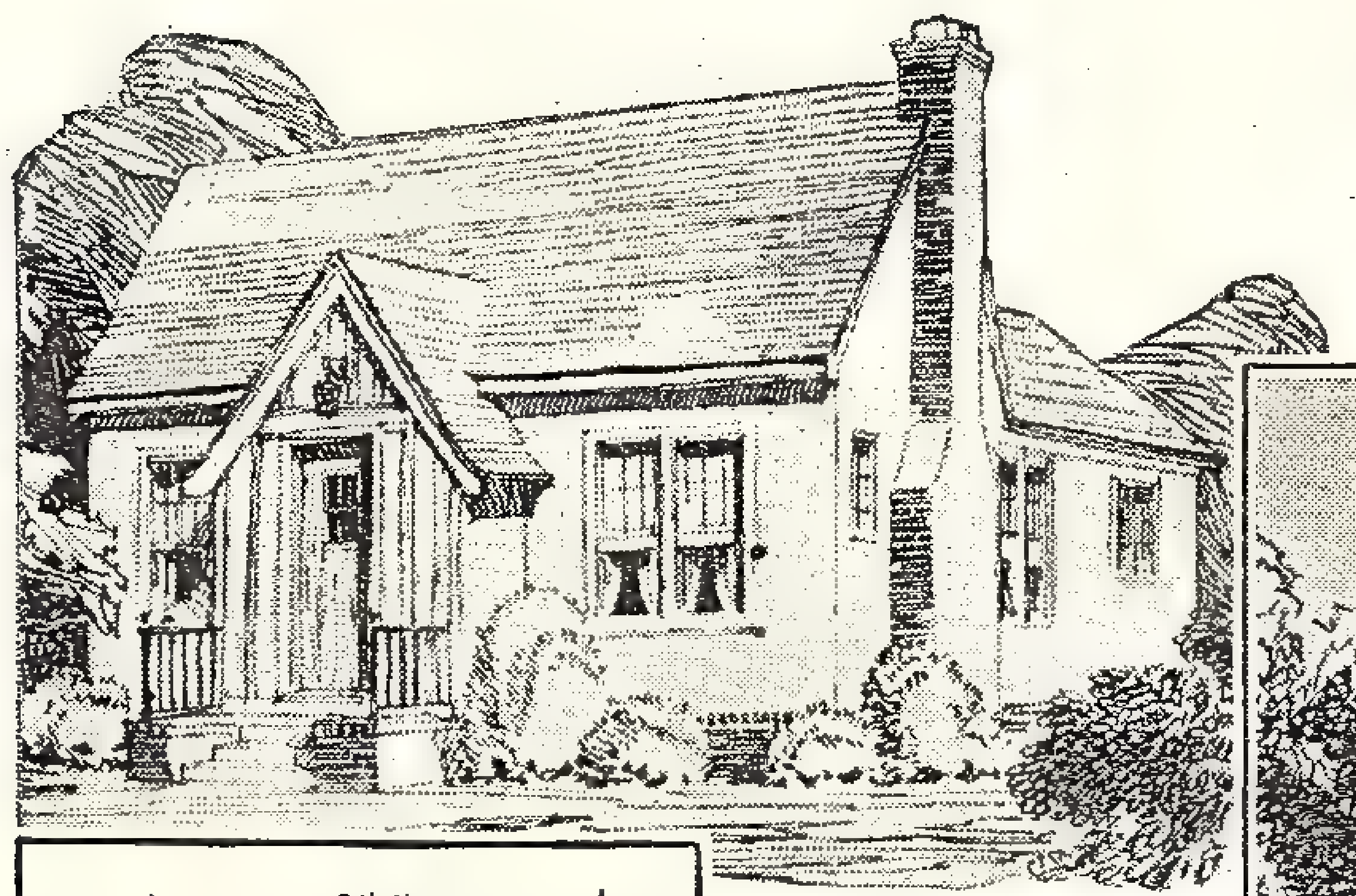


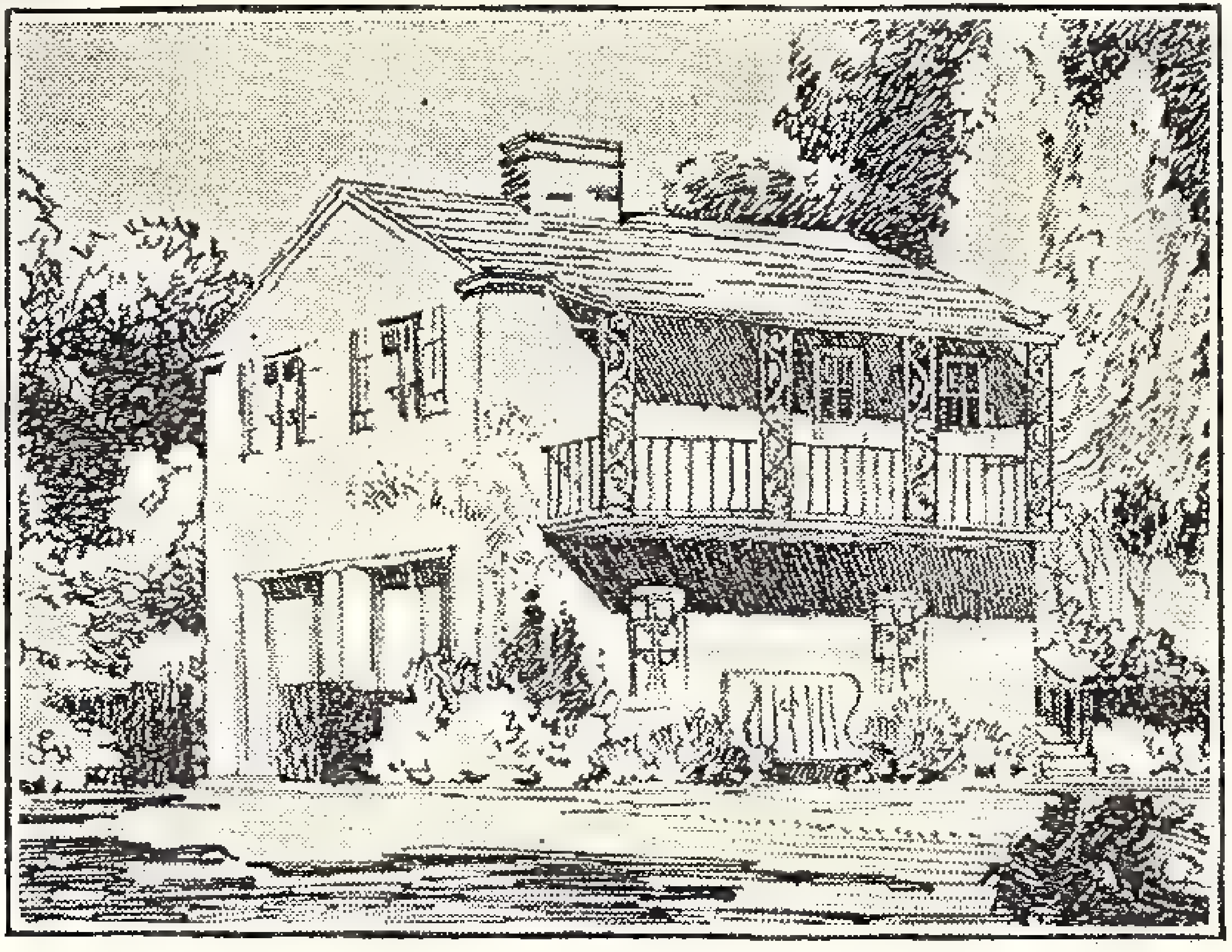
Side view of the Harlequin, showing all parts in place. Compare with the drawing on page 111.

How Much to Spend for a New Home

HOW TO GET BLUEPRINTS, PLAN BOOKS

A one-sheet blueprint of any house appearing in Modern Mechanix and Inventions magazine may be had for $1.00, postage prepaid. Two new plan books, "Homes for Newlyweds," containing 32 of the latest ideas for low cost homes, and "16 Selected Homes for Lean Purses" containing time, space and labor-saving bungalows, may be had for 15 cents each, or both books for 25 cents, postage prepaid. Address Home Building Editor, Modern Mechanix.





Above is seen house built from plan No. 5-S-32 — having five rooms and bath. House No. 3-G-51 may be seen at the right. A feature is the balcony which does duty as a sleeping porch in summertime.

THE depression has taught us a lot of things about money put into some banks as well as some homes. Even though times are hard and incomes lowered and many people unemployed there are still thousands of folks who have reasonable sums of money for home building but they are afraid to take chances. The question they want answered is, "How much to spend for a new home? What is a safe investment in these days of uncertainty?"

Today with the purchasing power of the dollar ranging anywhere from 20 to 40 percent higher than in boom times it's not perhaps so much a question of how much to spend, because everyone wants as much as possible for his money, but how much one can afford to spend due to fewer dollars in circulation and family pocketbooks growing thinner.

Today, because of cars, decreased incomes, increased taxes, and other things, shelter percentage has been squeezed down to around 16 percent and in some cases, less. Out of $1,800 per year income, $24 per month, or $288 per year, is about the limit most families of average income can stand.

Two Attractive Homes for Your Consideration

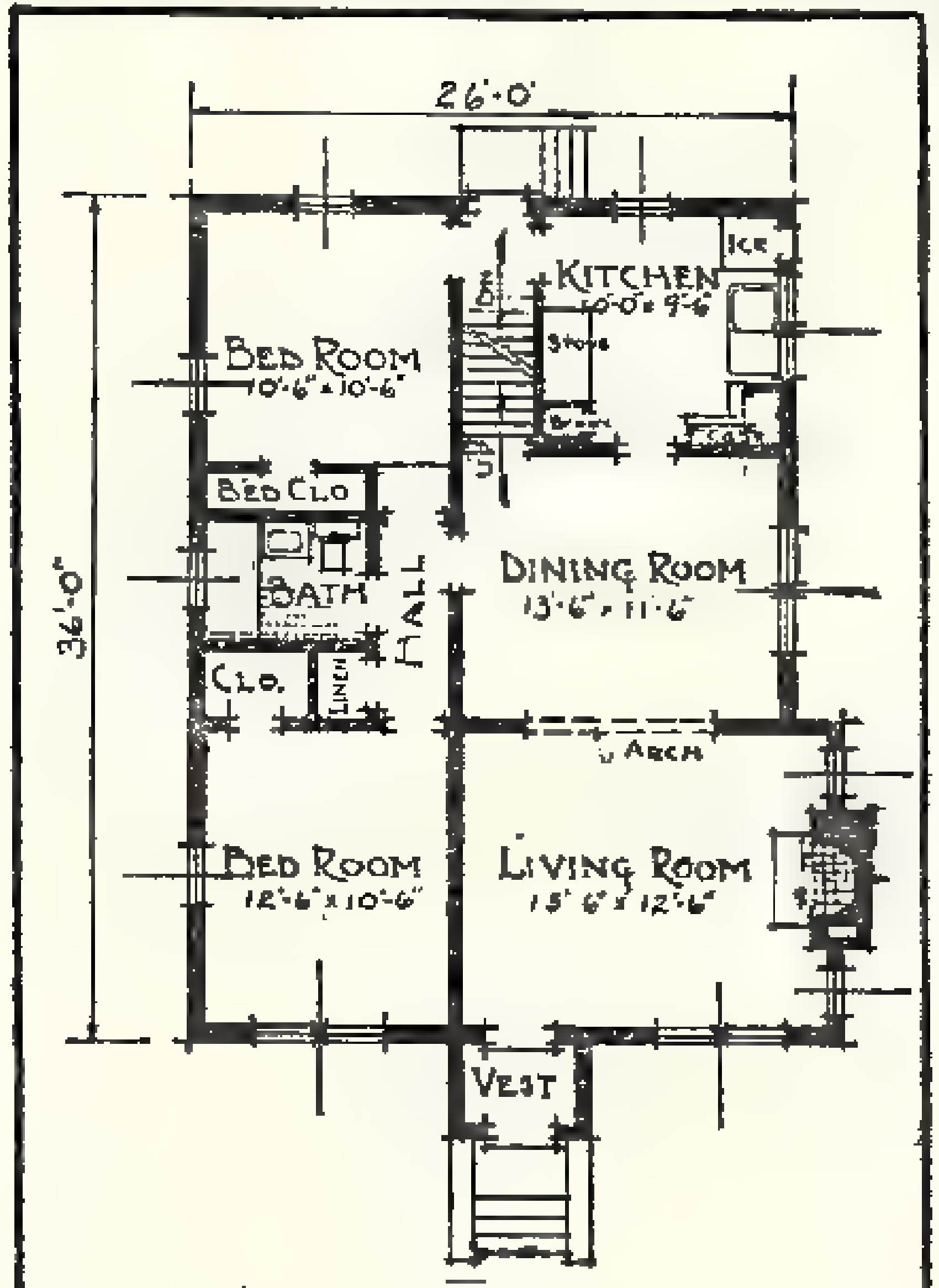
The two houses I have selected for this month's issue are fine examples of what can be done with first, an average income; and second, a greatly lessened income.

Plan 5-S-32 is what may be called the most popular of all standard bungalow designs. It's a straight-forward combination of living room, dining room and kitchen on one side of the house with two bedrooms and bathroom on the other. There's space above for storage and small sleeping accommodations.

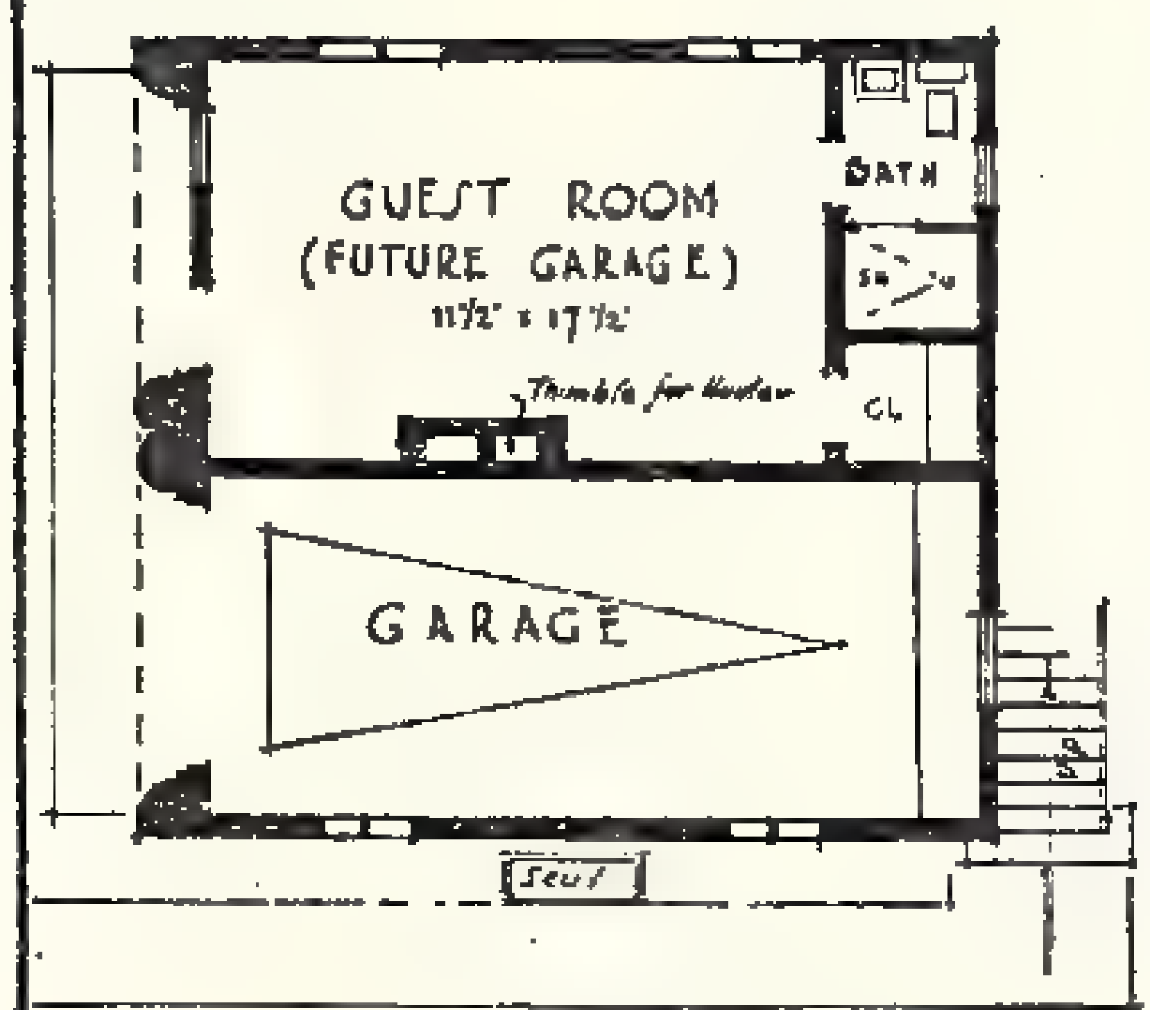
The house is 36 feet long and 26 feet wide. There's a full basement and complete insulation throughout. The house may be built of stucco, as shown, or of brick. A fireplace is a feature of the living room. This can be omitted and would save perhaps $200. There's a brick base course around the house.

About the cost? With present day prices for materials and labor this house as shown should be well under $5,000. This is a suggested price range. The cost may be considerably less depending upon where and how you build. It should come well within the range of average incomes, even in depression days.

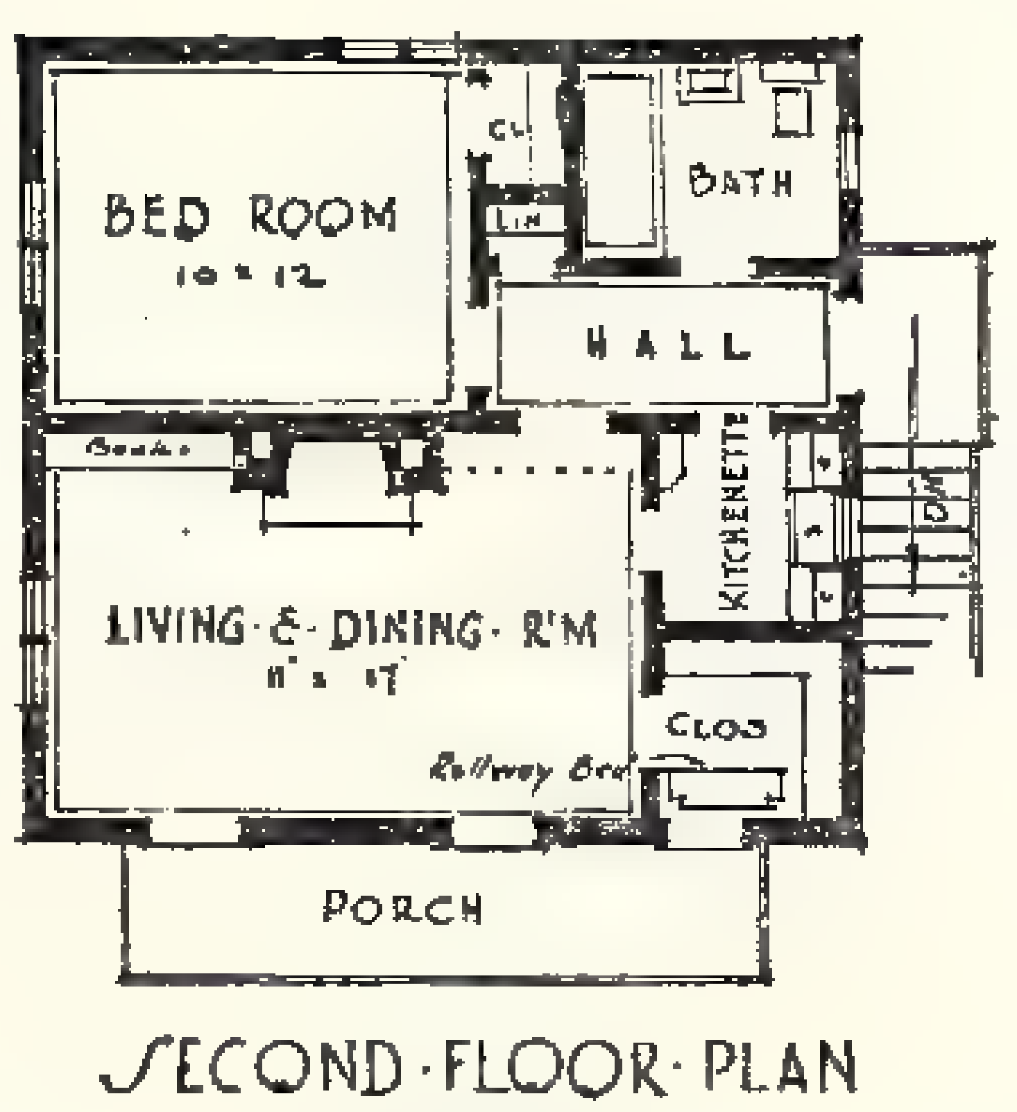
(Continued on page 132)



5-S-32



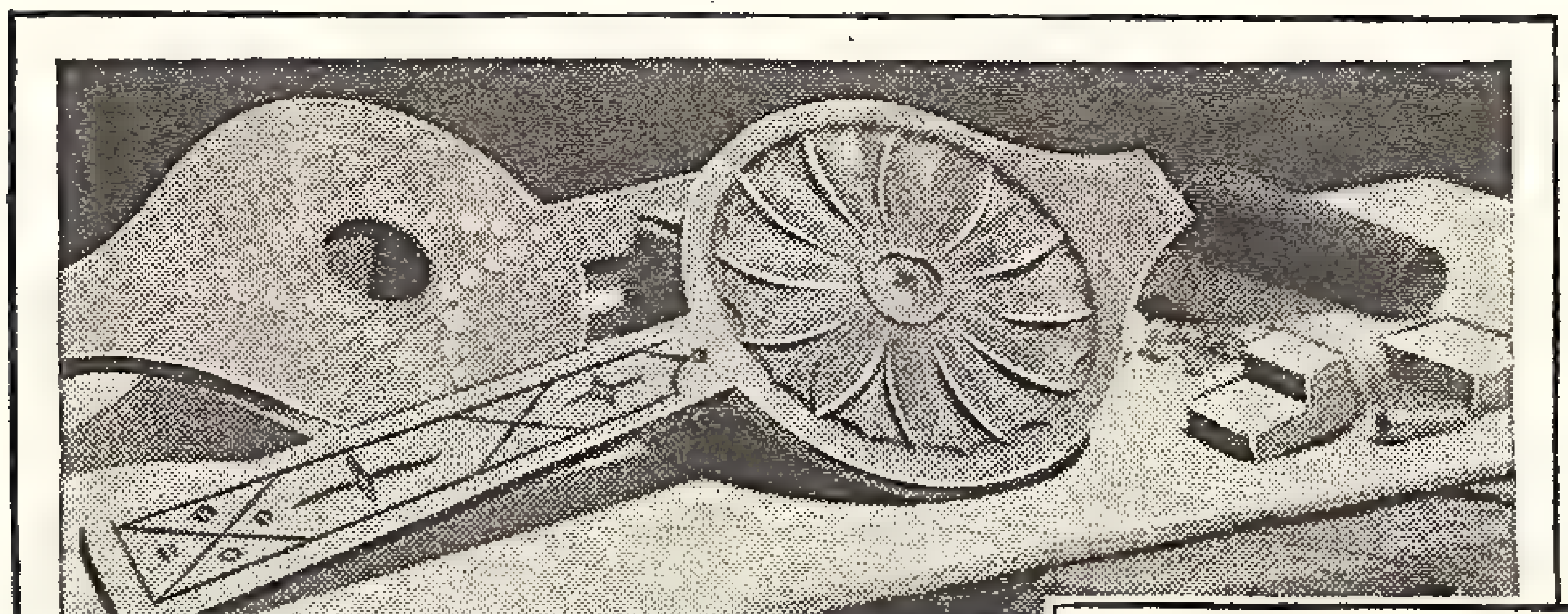
FIRST·FLOOR·PLAN
3-G-51

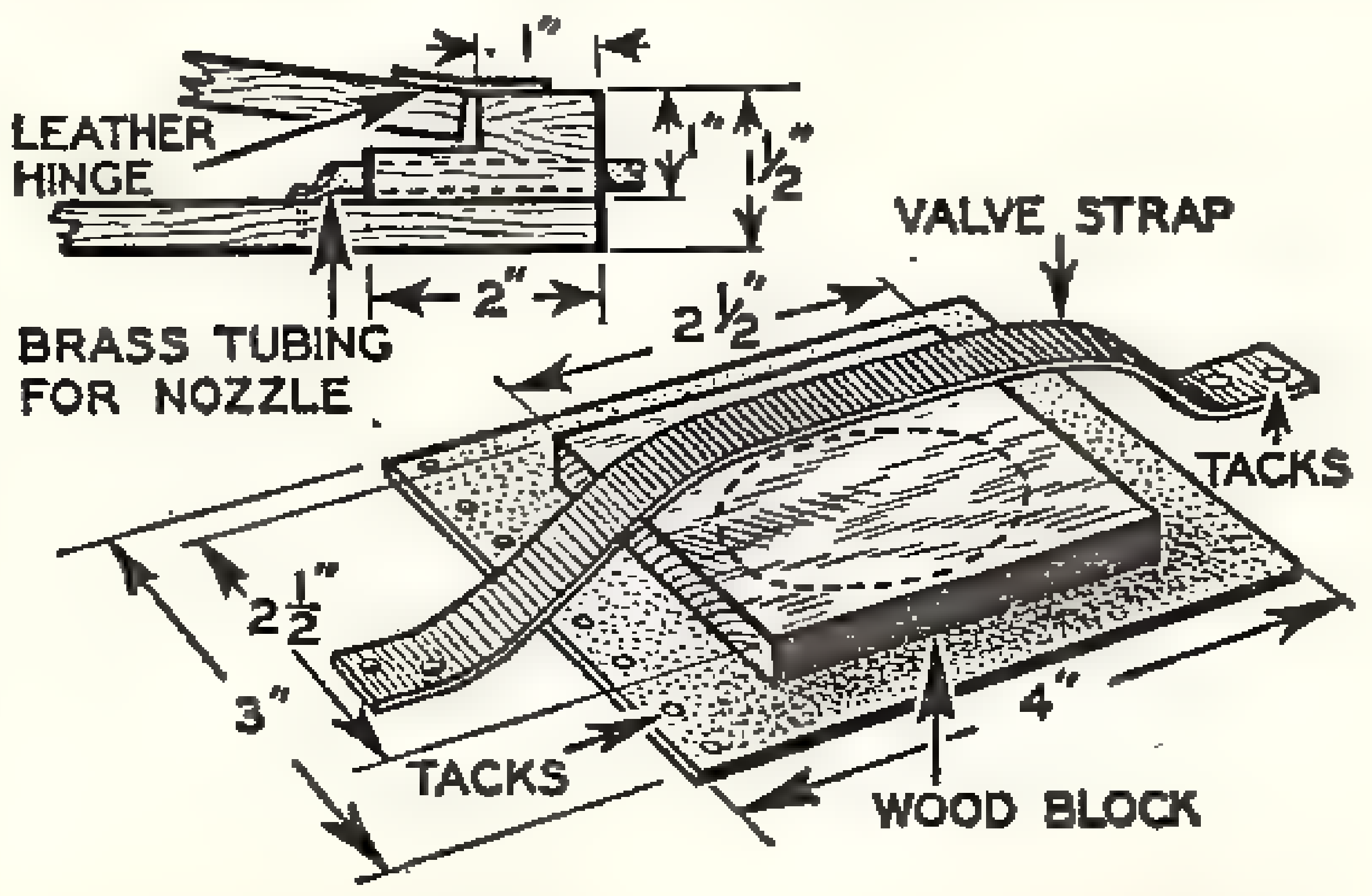


SECOND·FLOOR·PLAN
3-G-51

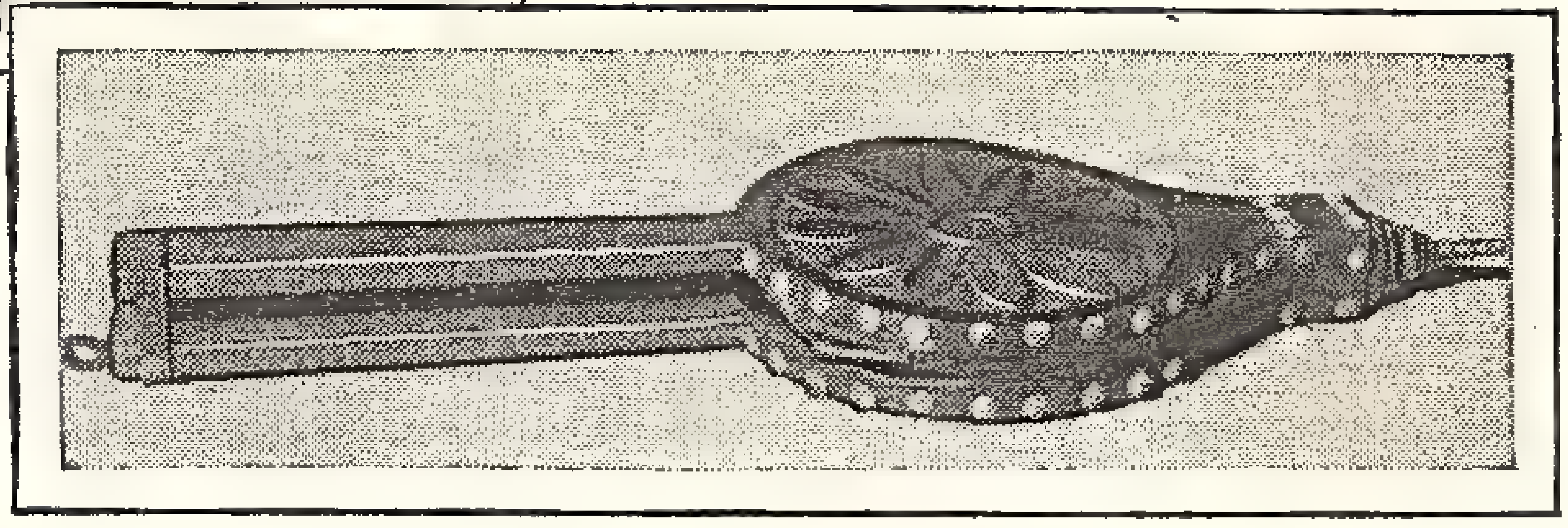
Here are floor plans for the two attractive homes shown in the drawings at top of the page.

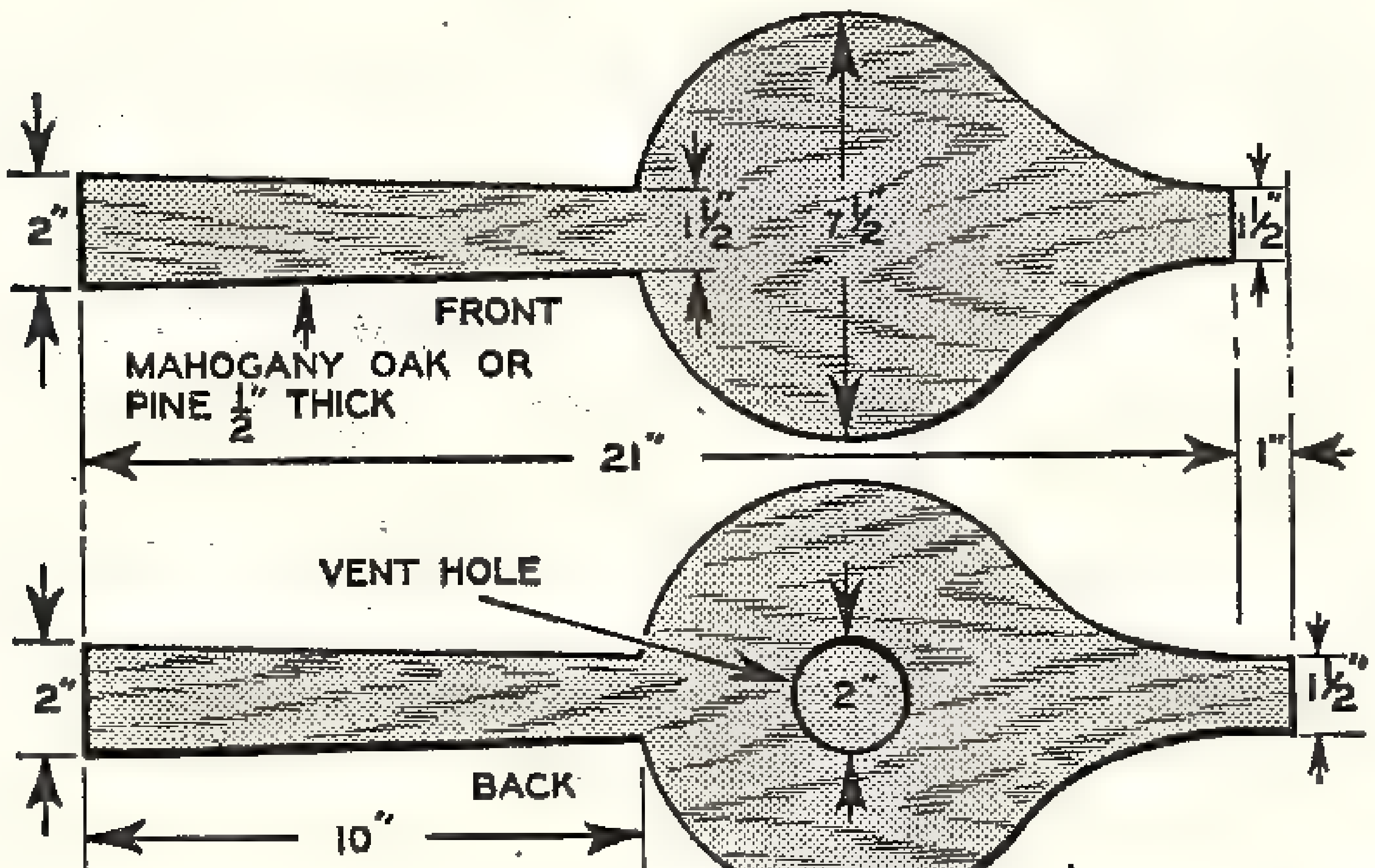
Old Fashioned Bellows Decorate Fireplace

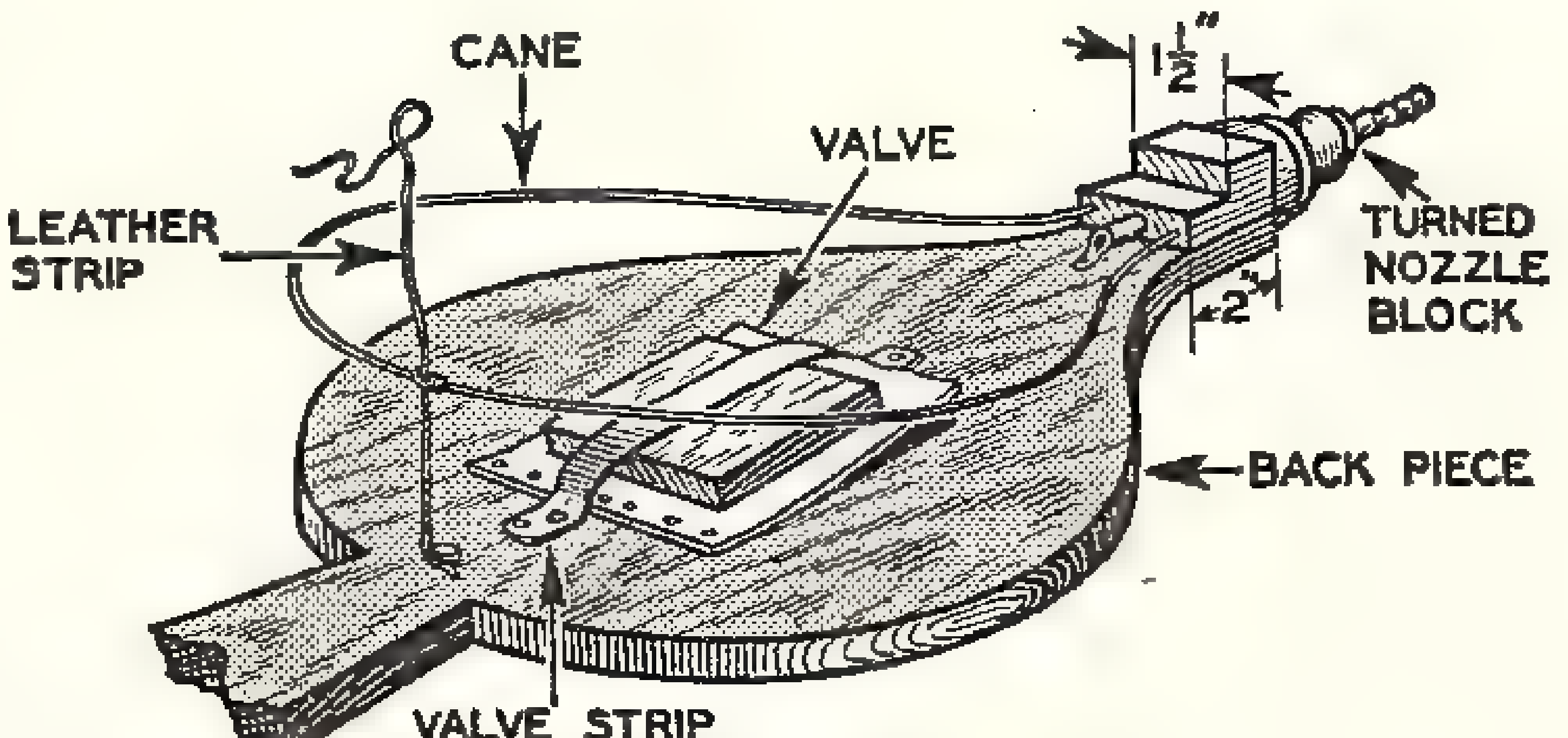


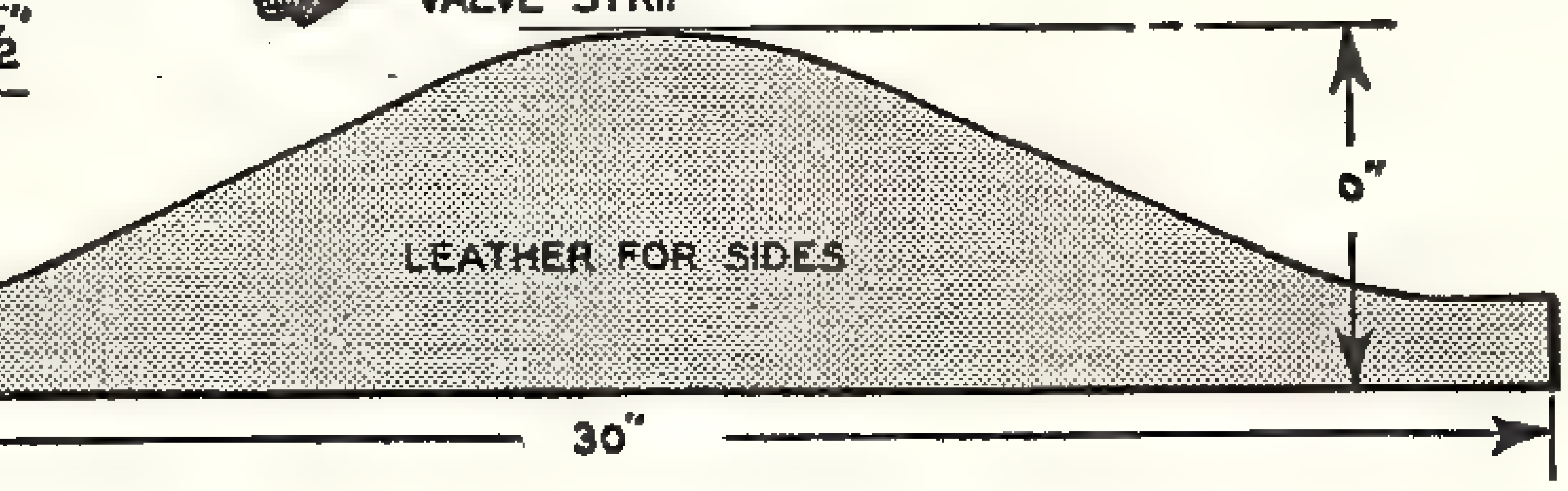


All parts necessary for construction of bellows are seen in photo above. Note decorations on face of front piece. Assemble the valve as illustrated at the top drawing. In the photo at right showing the completed bellows you will see how large headed tacks enhance beauty of the device. Strap on end of handles holds them together when the bellows are hung up beside fireplace.









Front and back pieces should be cut to dimensions given in this drawing. The strip of cane serves to hold the leather out during the pumping.

THOSE who have a strong liking for the antique will enjoy making the pair of bellows shown in the above photographs. They make a very attractive accessory for the fireplace and bring back a bit of old world charm. Walnut is recommended for making the back and front, but mahogany, oak or pine may also be used.

The front and back pieces are cut to the dimensions shown in the accompanying drawings. The extra length of the back allows the front to hinge onto the nozzle block. The decoration may be varied to suit the taste of the maker. Carving on walnut gives a very rich effect. This should be done before assembling the parts.

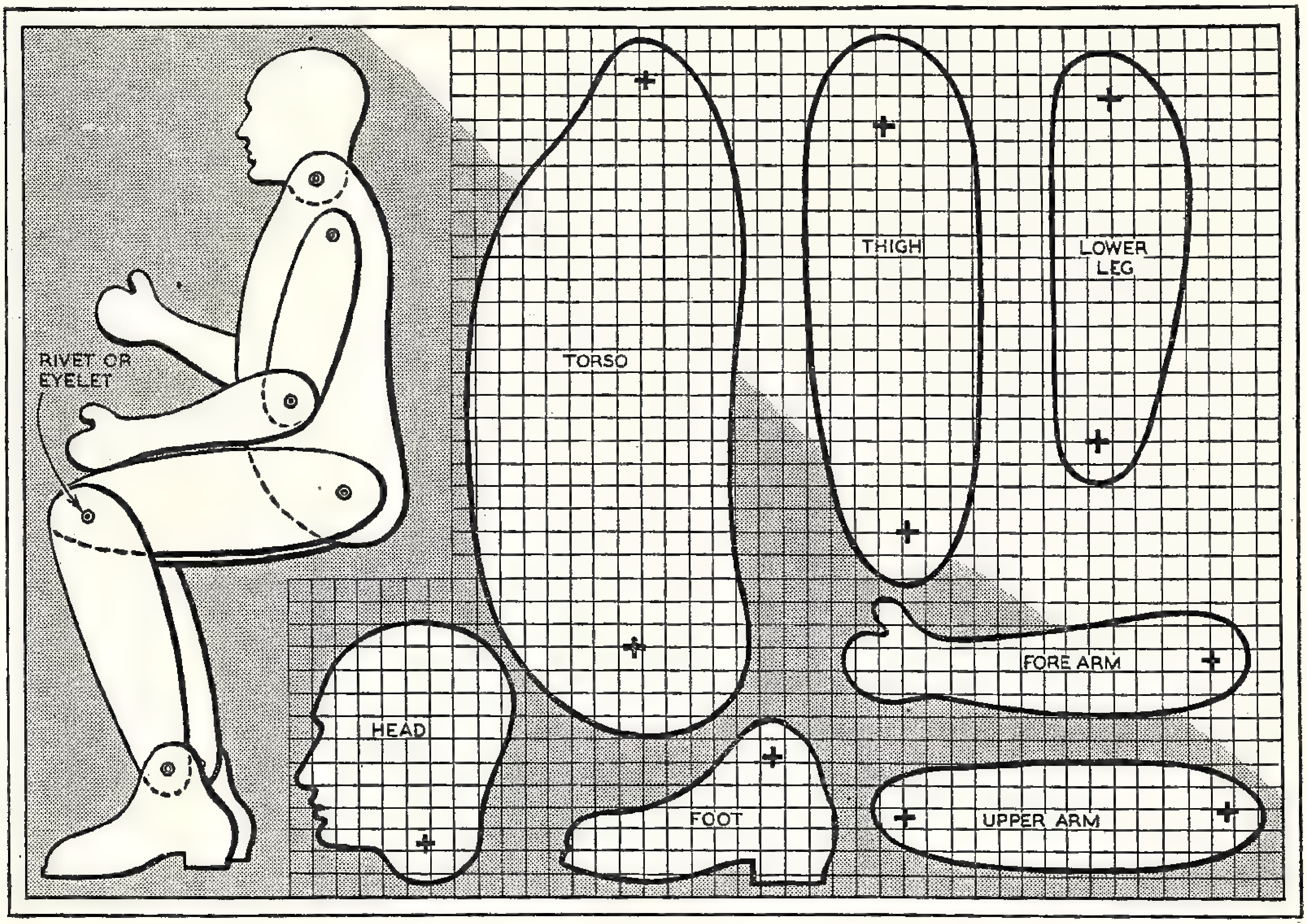
Make the vent as illustrated in the drawing at the top of the page. The wood block is glued to the leather and the latter is tacked to the back piece over the 2 inch vent hole. There is also a narrow strip of leather tacked at each end and looped loosely over the block to prevent the valve from opening too far.

The nozzle used in the tip is the end of a ½-inch water nozzle and is a stock part. As it is only 1½ in. long, it is necessary to turn the nozzle block down to meet it. Two holes are then bored in the end of the nozzle block to receive the ends of a piece of cane which is bent to the shape of the sides and glued into these holes. At the base of the handles, the cane is fastened with a piece of cord or leather tacked to the sides to hold the cane midway between the sides when they are extended.

The top side is then placed on the nozzle block, and a piece of leather tacked over the joint for a hinge. With the sides blocked in the open position, a paper pattern is made and a piece of leather cut to the shape of this pattern. This leather is then tacked to the sides, first smearing them with glue. Greatest care should be taken to get the leather on even, so that there will be no wobbling. Small headed tacks should be used so that the fancy headed tacks will cover them later.

A binding strip is then made by cutting a strip of leather ⅝ in. wide, folding over the edges and hammering them down to keep them in place. This completes the construction. Staining, shellacking and waxing makes a good finish for walnut, or any desired finish may be used.

Handy MANNIKIN for DRAFTSMEN



Cut out sections of anatomy for mannikin according to the squared chart above. Cross marks indicate holes for rivets.

OFTTIMES in designing seating arrangements of boats, autos and aircraft, there comes the question as to just how a man would figure in the proposal. To check this point the little mannikin shown above will prove handy. Very often a scale mannikin placed beside the profile of the finished design will show up errors in proportion that could not otherwise be detected.

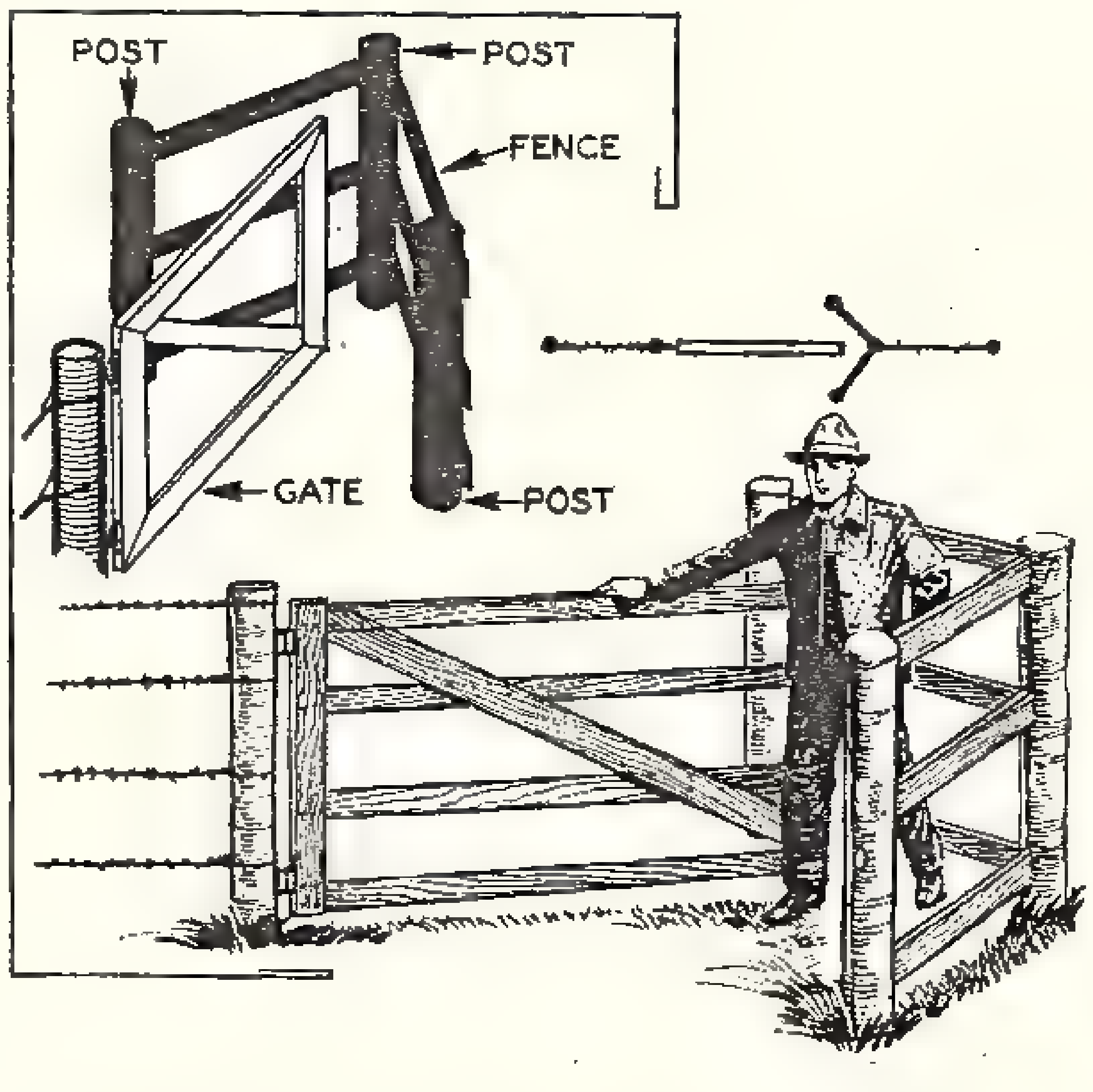
Every part of the body has been outlined in blocks which represent a square inch on the profile of the average size man. With the aid of these squares the body can be assembled to any scale by simply drawing the blocks to one inch dimensions of the scale you are using.

Transparent pyralin is the best material to make the mannikin from and next to this comes thin aluminum or dural sheet. Even red fibre will serve. The parts of the body are hinged at the point where the joints of the actual bones in the body occur, and real lifelike positions can be obtained.

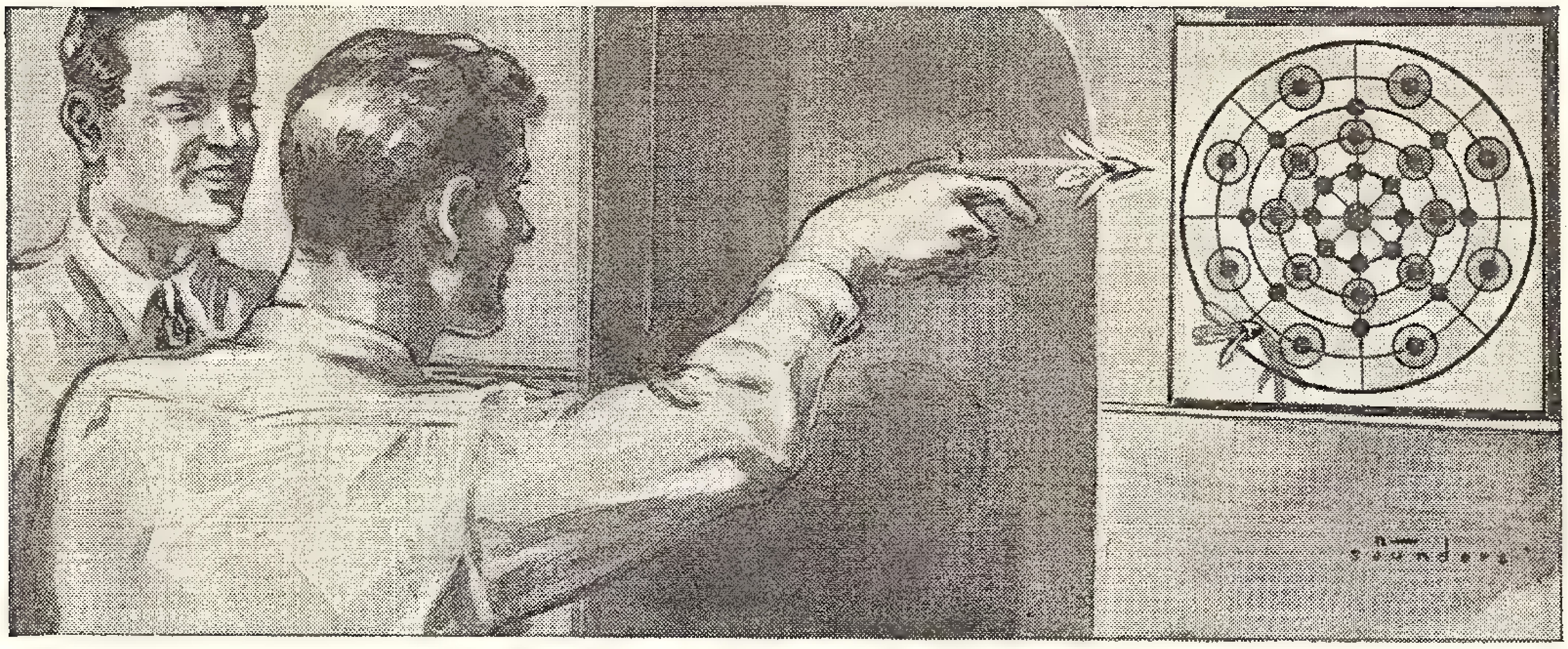
The joints are marked on each point of the body and it is at these points that the mannikin must be jointed. The joints of the mannikin are formed with eyelets or loose rivets in the case of metal figures. In the smaller sizes it will be just as well to combine the head and torso and foot and lower limb.—Hi Sibley.

Gate Kink Admits Humans, Bars Animals

HERE'S a little kink that every stock farmer will welcome. A person can get through easily enough, but cows, horses, etc., haven't a chance because they lack the intelligence to work the mechanism. On each side of the fence, and about three feet apart, drive two posts approximately six feet high. How this is done is illustrated in the drawing at the right. These posts should be placed so that when the gate is open it will come to the posts, but will not go past them. Wire or boards will do duty as a fence. The gate need not be fastened, for it cannot be left open. Wagons, or trucks, as you notice, cannot pass.—John Wasson.



Keep Up Baseball Skill With Dart Game



Play the indoor ball game by taking position ten or fifteen feet away from the target and heaving the darts at it.

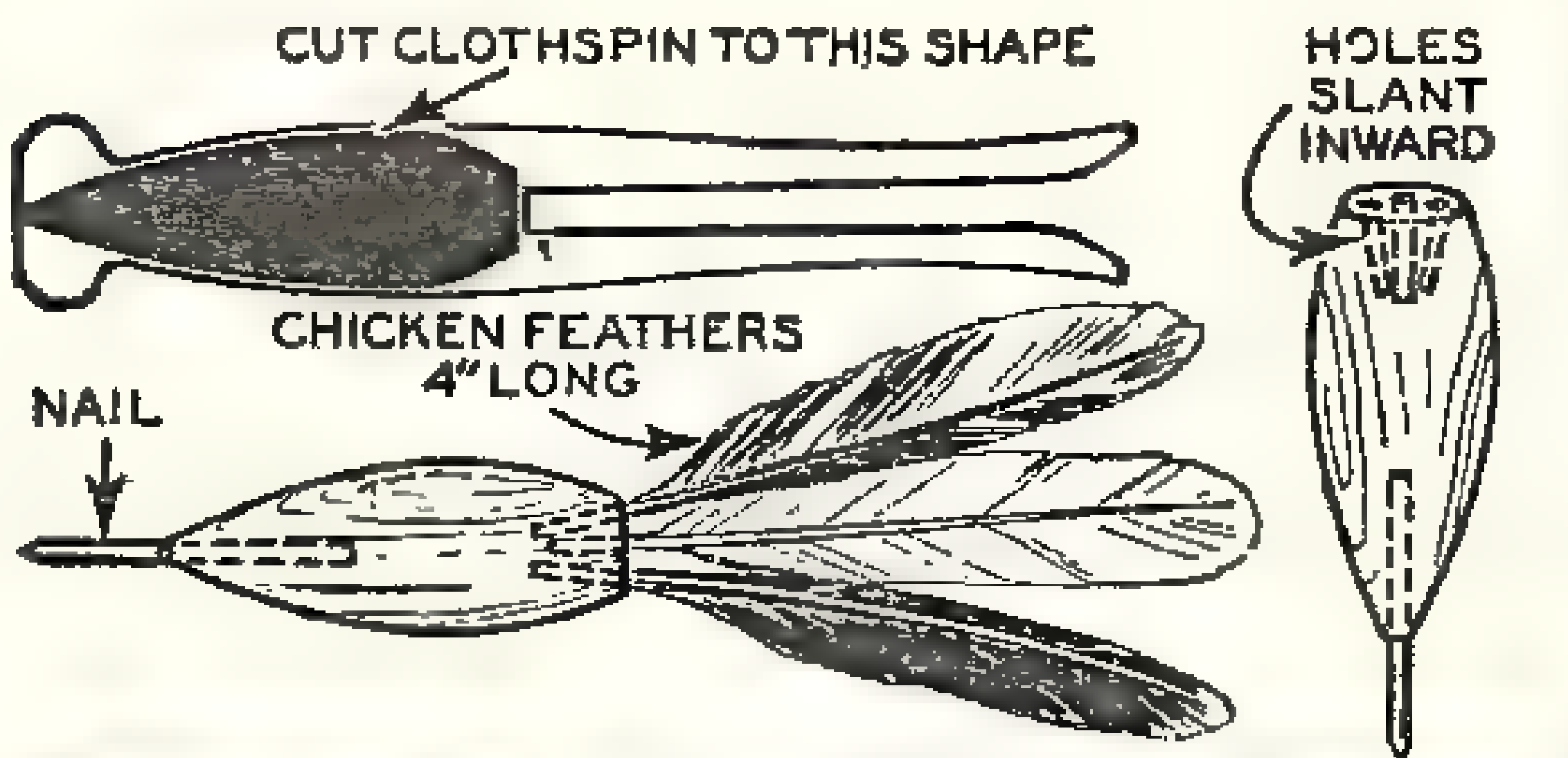
YOU baseball fans who are denied your games in the winter time can have your sport indoors with this novel little dart game. The equipment is not balls, bats and gloves, but a target and a couple of darts, which are pitched from a distance of fifteen or twenty feet, as demonstrated in the drawing above.

The target is nothing more than a piece of wall-board two feet square, marked off as illustrated in the drawing below. Scribe the five concentric circles with a pair of dividers, making the diameters, starting from the inside, 2½ in., 5 in., 8 in., 10 in., and 12 in., respectively. Bind the edges of the board with tape.

Then with a ruler divide your circles into 8 segments, and at the intersections of the curved and straight lines scribe the smaller circles shown in the layout of the target. The black circles should be slightly under 1 in. in diameter with the outer circles a little larger. Use your own judgment here.

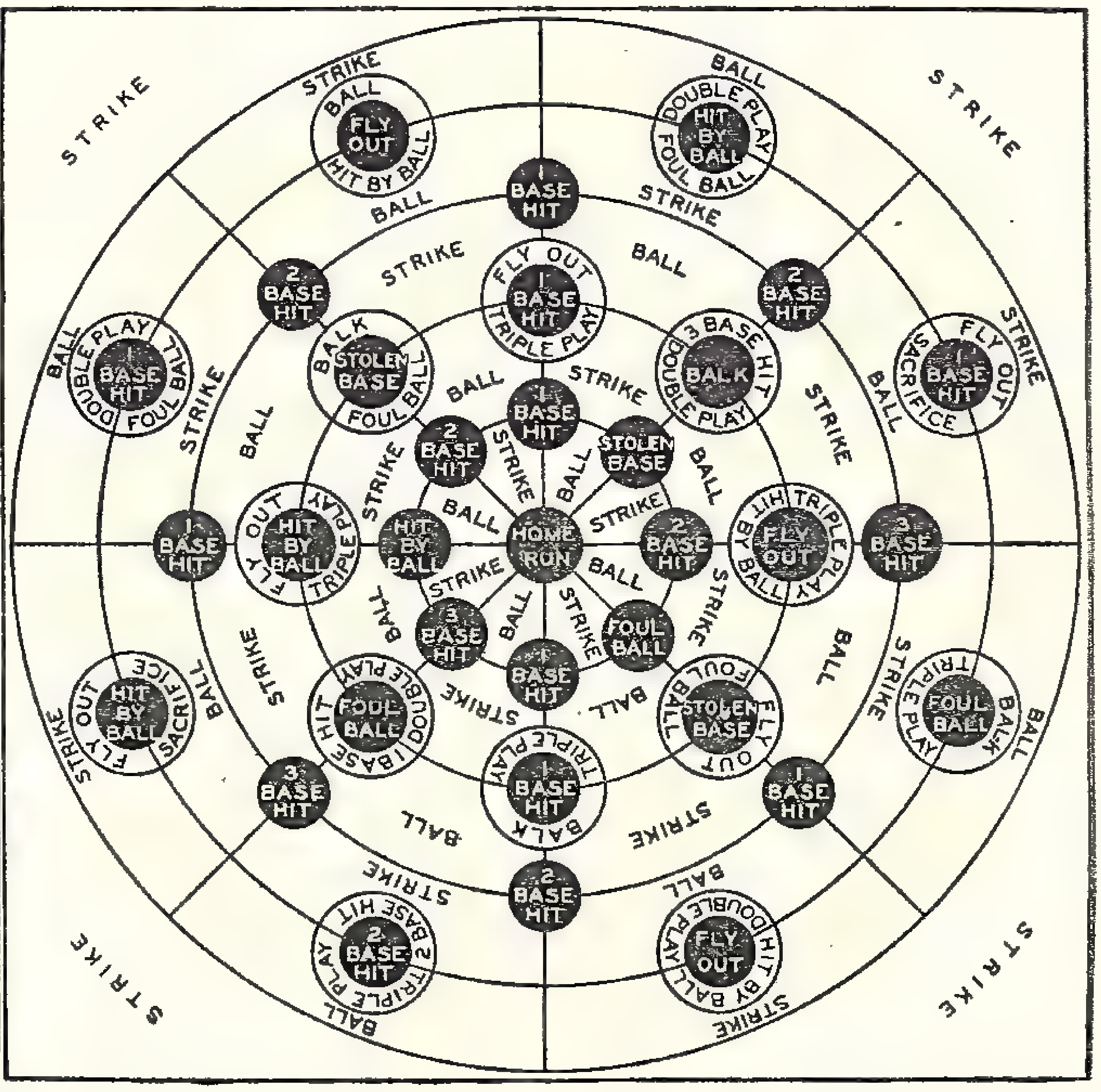
The darts are just as easy to make. The most difficult job is whittling down the clothespins to shape given in the drawings below. In the tops of these whittled-off pieces bore three small holes slanting inward to give an outward pitch to the chicken feathers which are plugged into the holes. In the tip of each dart bore a small hole to take a finishing nail, which should be filed to a sharp point, so that it will stick in the target.

Now about the scoreboard and scoring. Layout of the former is seen below. Scoring is done just as in a real game, with the "outs" keeping tally on the "ins."


CUT CLOTHSPIN TO THIS SHAPE
HOLES SLANT INWARD
CHICKEN FEATHERS 4" LONG
NAIL

SCOREBOARD

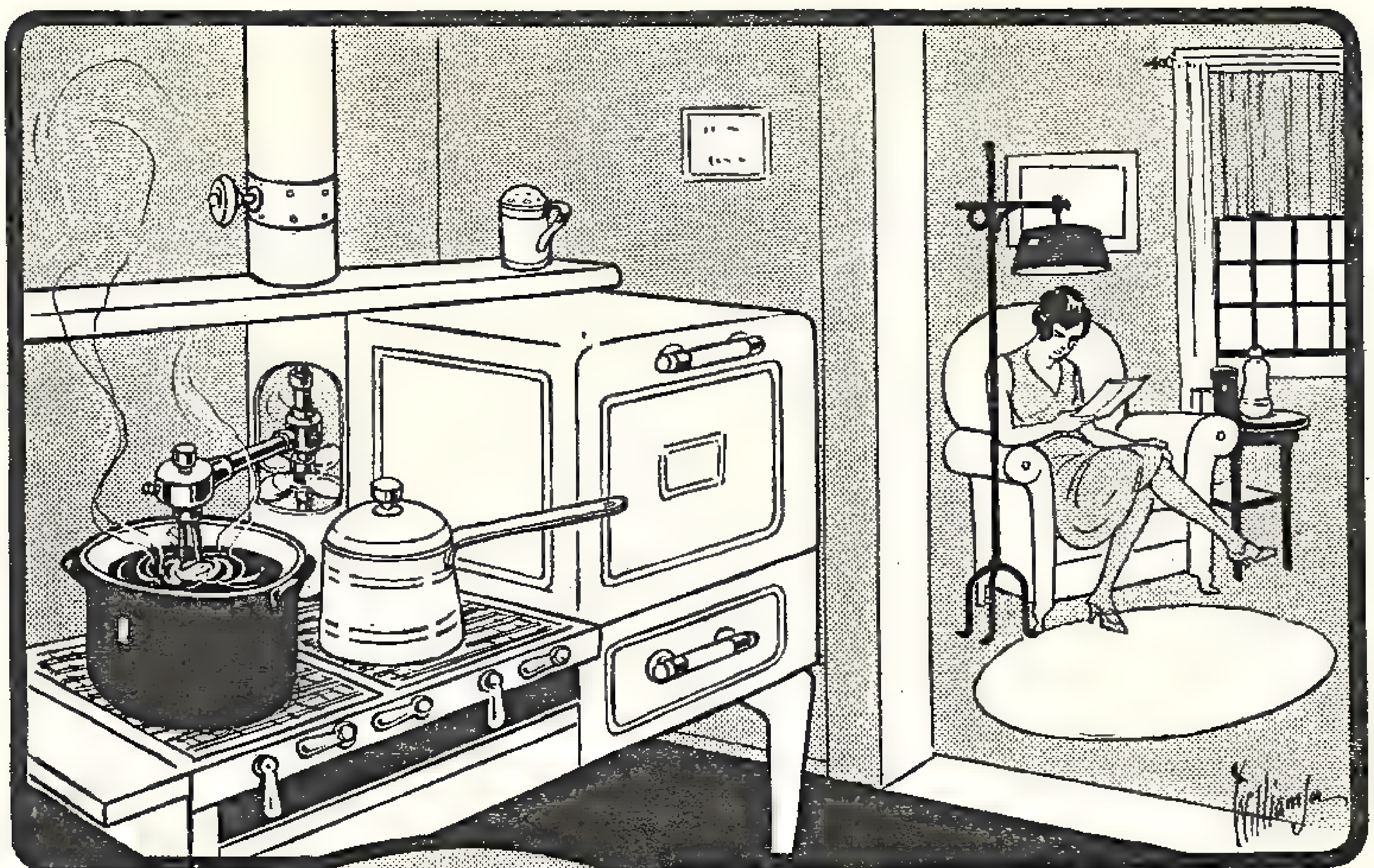
	1	2	3	4	5	6	7	8	9				
THEY													
WE													


HOME RUN
1 BASE HIT
2 BASE HIT
STOLEN BASE
2 BASE HIT
FOUL BALL
1 BASE HIT
3 BASE HIT
HIT BY BALL
STRIKE
BALL
FLY OUT
1 BASE HIT
TRIPLE PLAY
BALK
3 BASE HIT
DOUBLE PLAY
HIT BY BALL
FLY OUT
TRIPLE PLAY
FOUL BALL
DOUBLE PLAY
1 BASE HIT
STOLEN BASE
FOUL BALL
FLY OUT
1 BASE HIT
BALK
TRIPLE PLAY
2 BASE HIT
3 BASE HIT
2 BASE HIT
3 BASE HIT
1 BASE HIT
HIT BY BALL
DOUBLE PLAY
FOUL BALL
FLY OUT
HIT BY BALL
1 BASE HIT
SACRIFICE
FLY OUT
HIT BY BALL
SACRIFICE
FOUL BALL
TRIPLE PLAY
BALK
FLY OUT
DOUBLE PLAY
HIT BY BALL
2 BASE HIT
TRIPLE PLAY
2 BASE HIT
STRIKE
BALL

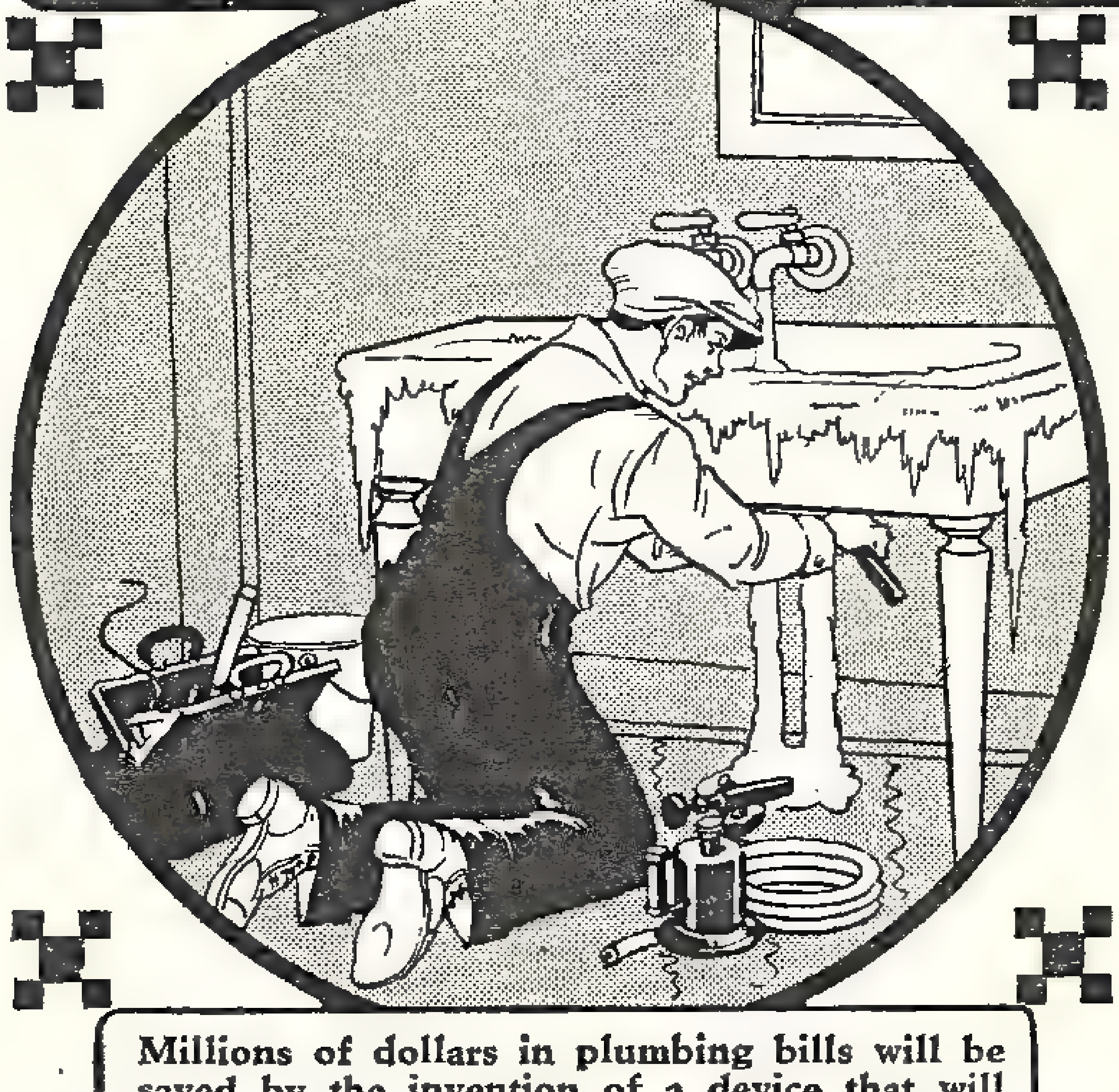
Lay out your target according to the plan shown at right. Diameters are 2½ in., 5 in., 8 in., 10 in. and 12 in. Darts are made by whittling down clothespins, boring three holes in top, and insetting feathers. Set a finishing nail in the tip.

FORTUNE MAKING Ideas

Andrew Carnegie, the great steel king, once said that it is upon trifles that the greatest gifts of the Gods often hang. This is especially true in the field of invention. Ofttimes it is the simple ideas, such as those outlined here, that make the biggest fortunes. Get busy—see what you can do.



A simple pot stirring attachment for the kitchen stove will win favor with millions of housewives and bring big rewards to the fortunate inventor.



Millions of dollars in plumbing bills will be saved by the invention of a device that will prevent breakage of pipes when the bitter cold weather sets in.

Piano keys have a way of getting dirty and yellow with passage of time. What is needed to remedy this situation is some simple chemical compound for whitening the ivories and restoring their original lustre. The market is calling for such a preparation, so get busy you inventors.

TODAY is the inventor's day more than it has ever been in the history of mankind. We need new things, new ideas, better ways of doing old chores. Industrial paralysis such as we have been passing through finds its defeat ultimately in new ideas, new inventions.

Now is the time to invent, now is the time to reap the richest rewards. Pity those who think that times of depression are not for the inventor. They are his heydays.

1. *Automatic Pot Stirrer*

We have many and marvelous automatic machines in this great day and age, and yet housewives still stand over hot stoves to stir their pots and kettles. Why not a little device that could be set to do this and permit the housewife to go about her other work?

We have the energy in the form of heat in the stove itself and all we need is some sort of a little heat engine that will do the trick.

Specifications: This problem would be impractical if solved electrically for the simple reason that stoves are hot and insulation is perishable. The device should be thermal and the invention should be developed with the thought in mind that few people would want to pay over a dollar for it.

Exploitation: Should be sold entirely on royalty and the inventor should ask 4% of the gross. Only Americans would appreciate an invention of this sort and it should be patented in United States and Canada only.

2. *Anti-freeze Device*

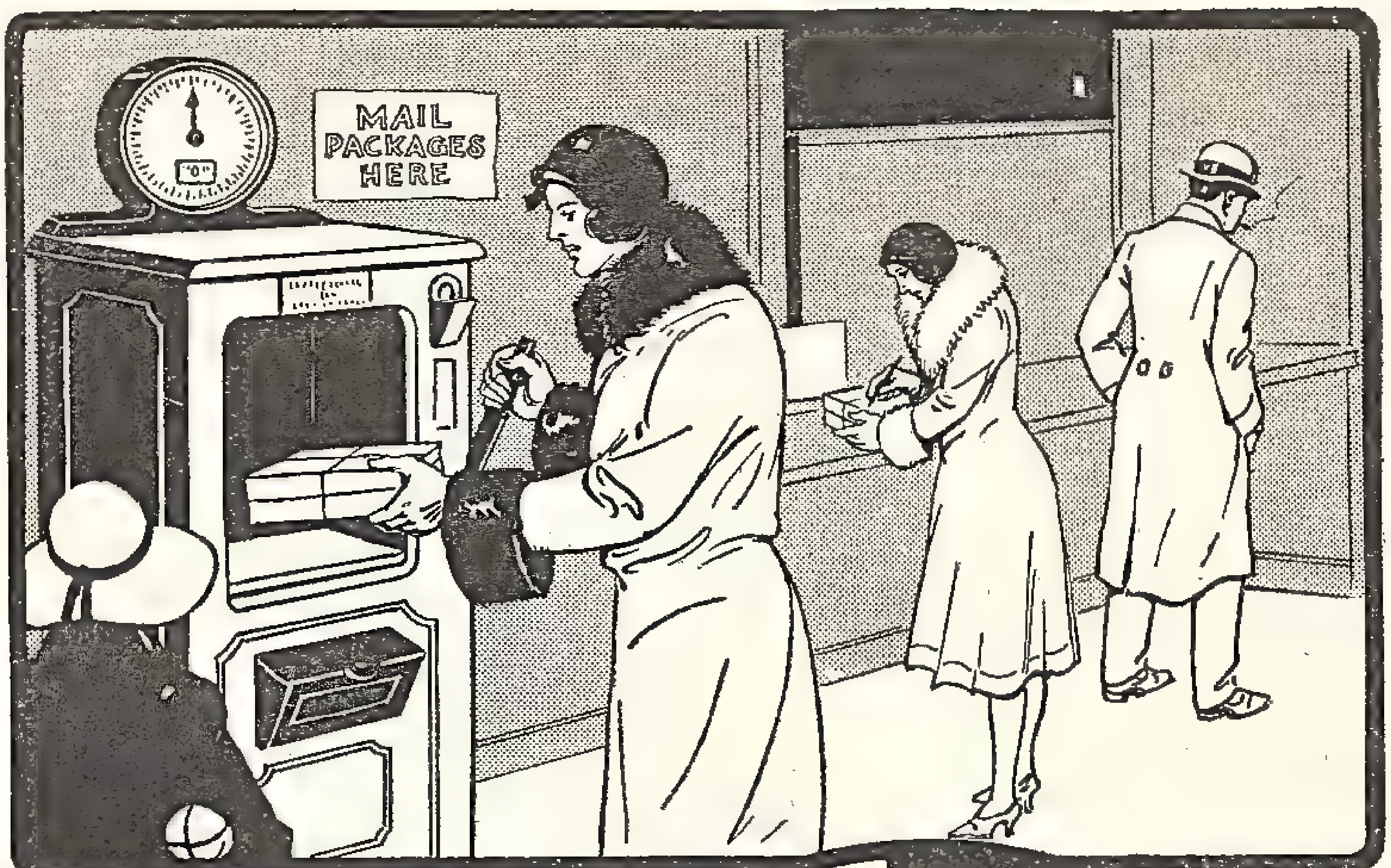
Every year in the northern climates plumbers wax rich and millions of dollars are lost through freezing water pipes. It

for INVENTORS

by RAYMOND F. YATES

INSTRUCTIONS TO INVENTORS WANTING ADVICE

Mr. Yates, who conducts this special department for inventors, stands always ready to give expert advice on patent law and marketing procedure to Modern Mechanix and Inventions readers. When requesting advice, however, do not send models, as they will not be accepted. Your requests will be taken care of promptly and adequately if you merely send a clear drawing and complete constructional and operating data. Stamped return envelope must be enclosed. Address Mr. Yates in care of Modern Mechanix and Inventions, 529 So. 7th St., Minneapolis, Minn.



Machines that will weigh and stamp packages or letters on Sundays and holidays will prevent delay in handling mails for the impatient public.

really seems as though there would be some method of permitting expansion to take place in pipes without their freezing. Perhaps some kind of a gadget placed in the water line would take care of the matter. At any rate I certainly do know that a mint of money could be made with the scheme.

Specifications: Should not cost over fifteen dollars and must be able to prevent pipes either from bursting after they freeze or from freezing in the first place.

Exploitation: Should be patented in all northern countries and sold on a royalty in each country.

3. *Making Piano Keys White*

I cannot help but wonder why some wise fellow has not developed a simple compound for whitening piano keys. I once tried to buy such a thing and found that it was not manufactured. Here is a fine opportunity to develop a fast working material that any housewife may safely use and that may be protected with a formula patent.

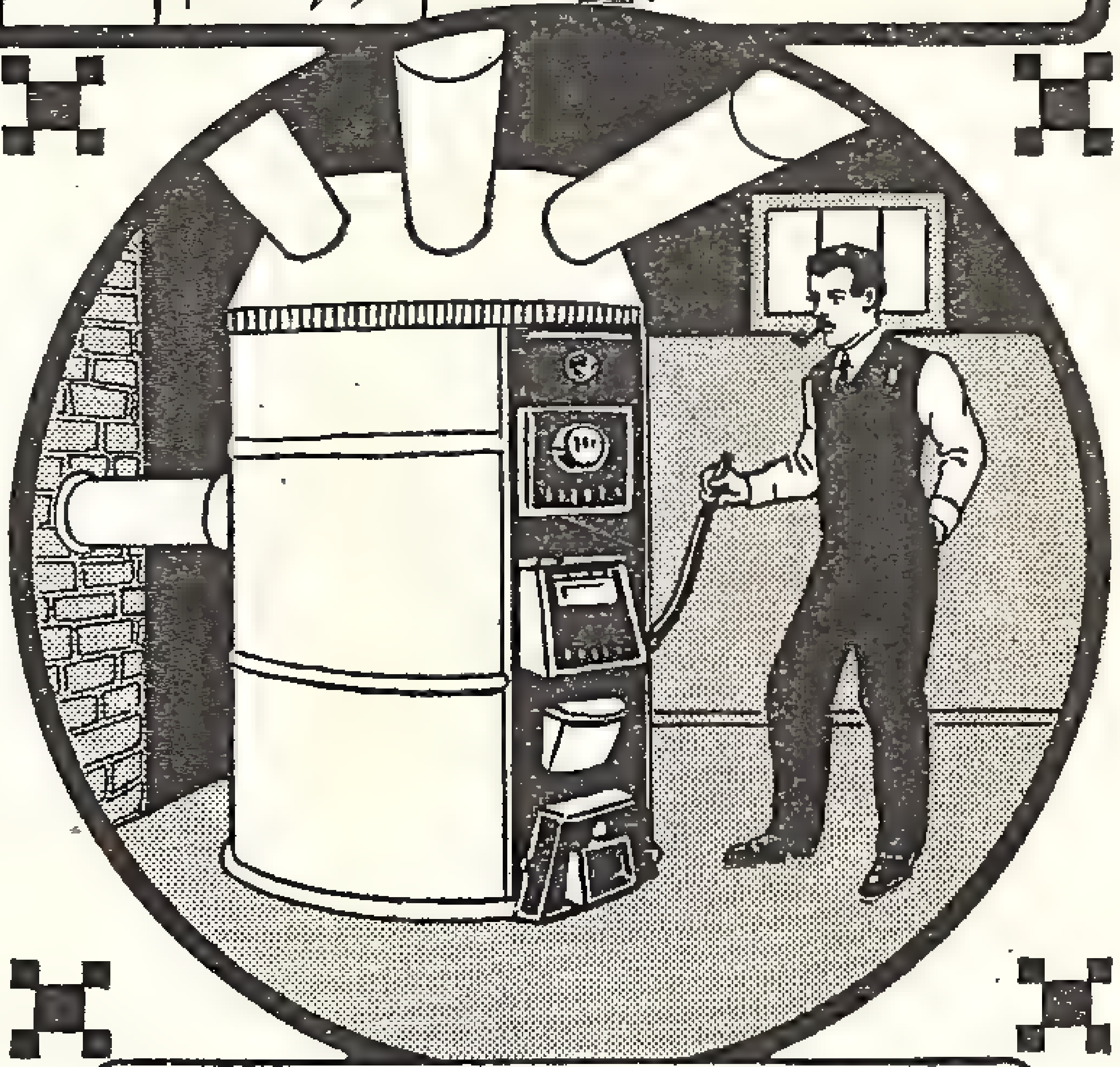
Specifications: Should be made to sell for twenty-five cents and enough should be placed in each can or package to permit cleaning the keys at least a dozen times. The material should not only function in connection with pure ivory keys but it should also be effective in connection with the cheap celluloid substitutes.

Exploitation: This should be patented in all of the leading countries of the world and sold on royalty.

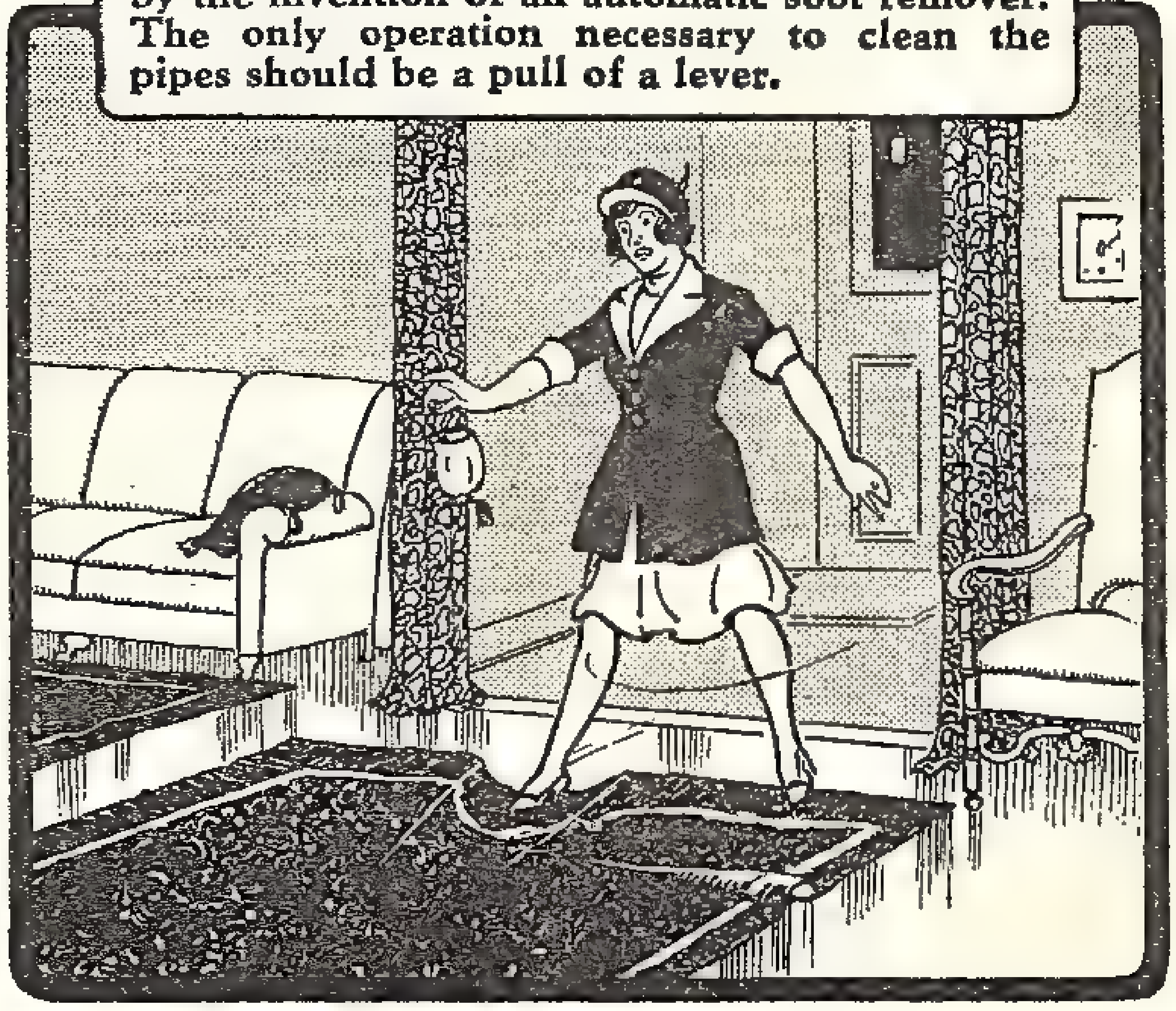
4. *Automatic Postage Machine*

Our post offices are always closed on Sundays and holidays. What is needed is an automatic postage machine into which we

(Continued on page 140)



Considerable savings in coal bills will be made by the invention of an automatic soot remover. The only operation necessary to clean the pipes should be a pull of a lever.



Nothing is more attractive than a waxed floor, yet nothing is more dangerous. Won't some kind-hearted inventor get busy and develop a material which will polish the floor to a high shine, but at the same time leave a non-skid surface, which won't be a menace to everyone.

Decorate Your Home with Antique Lantern

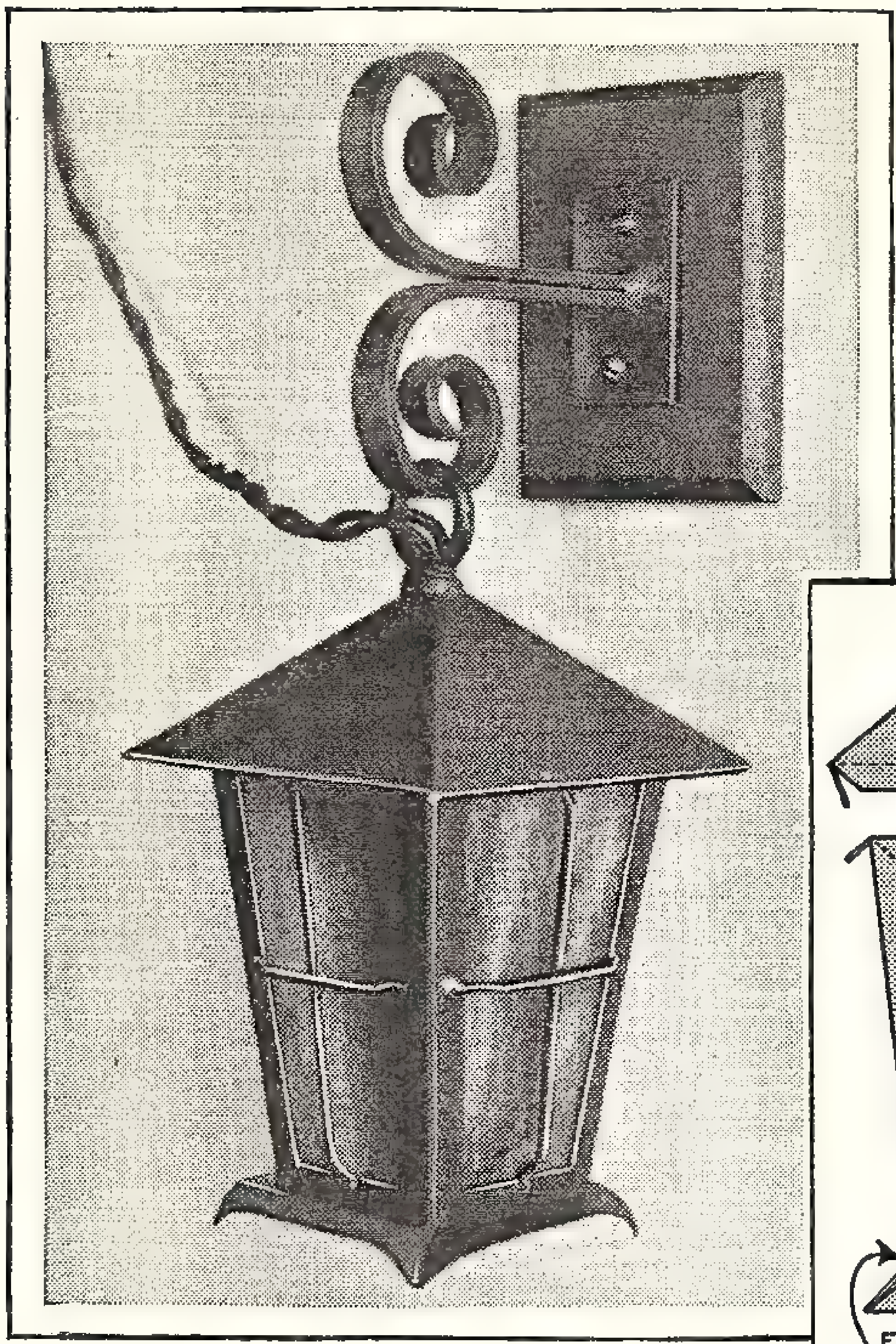
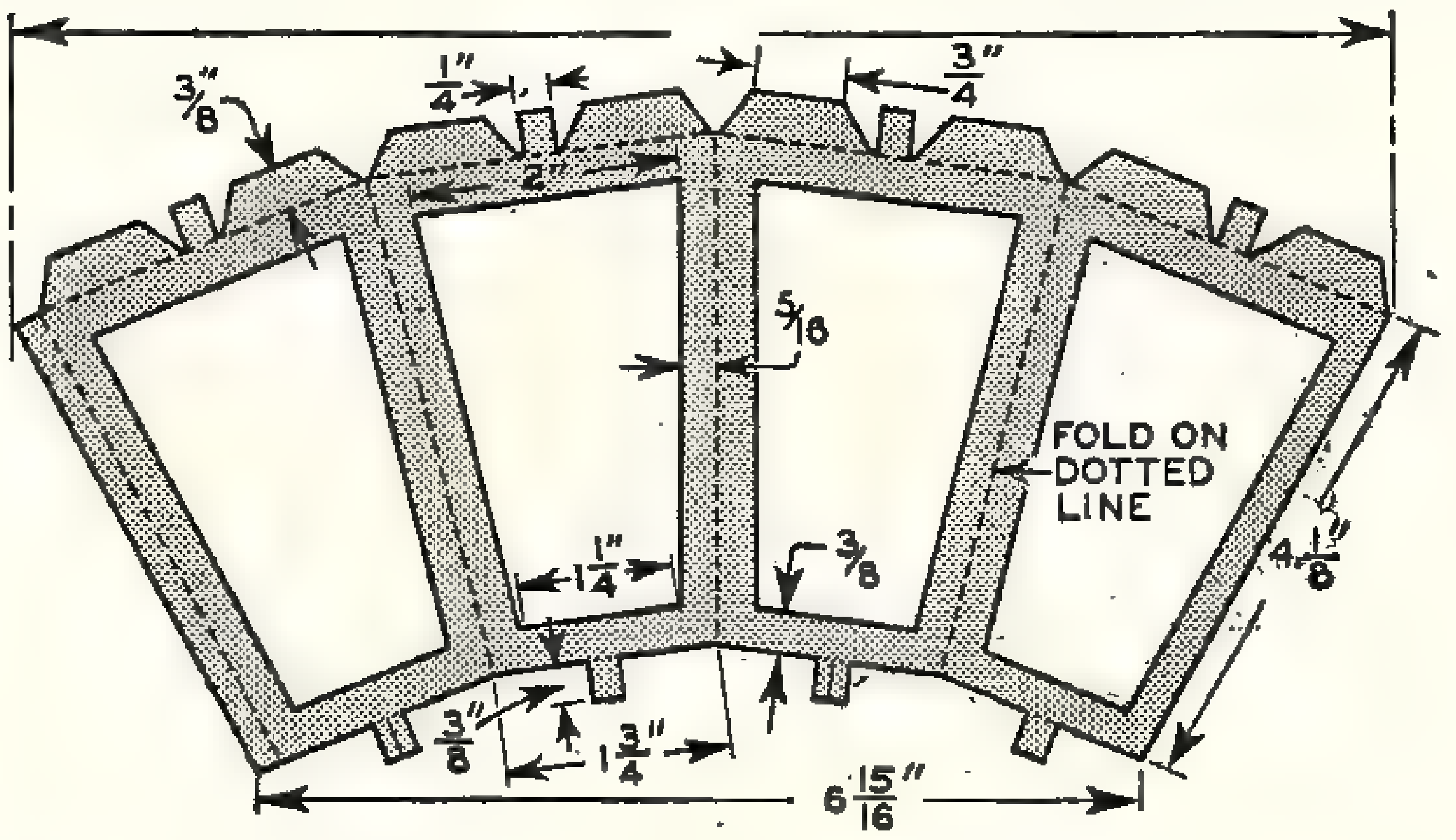
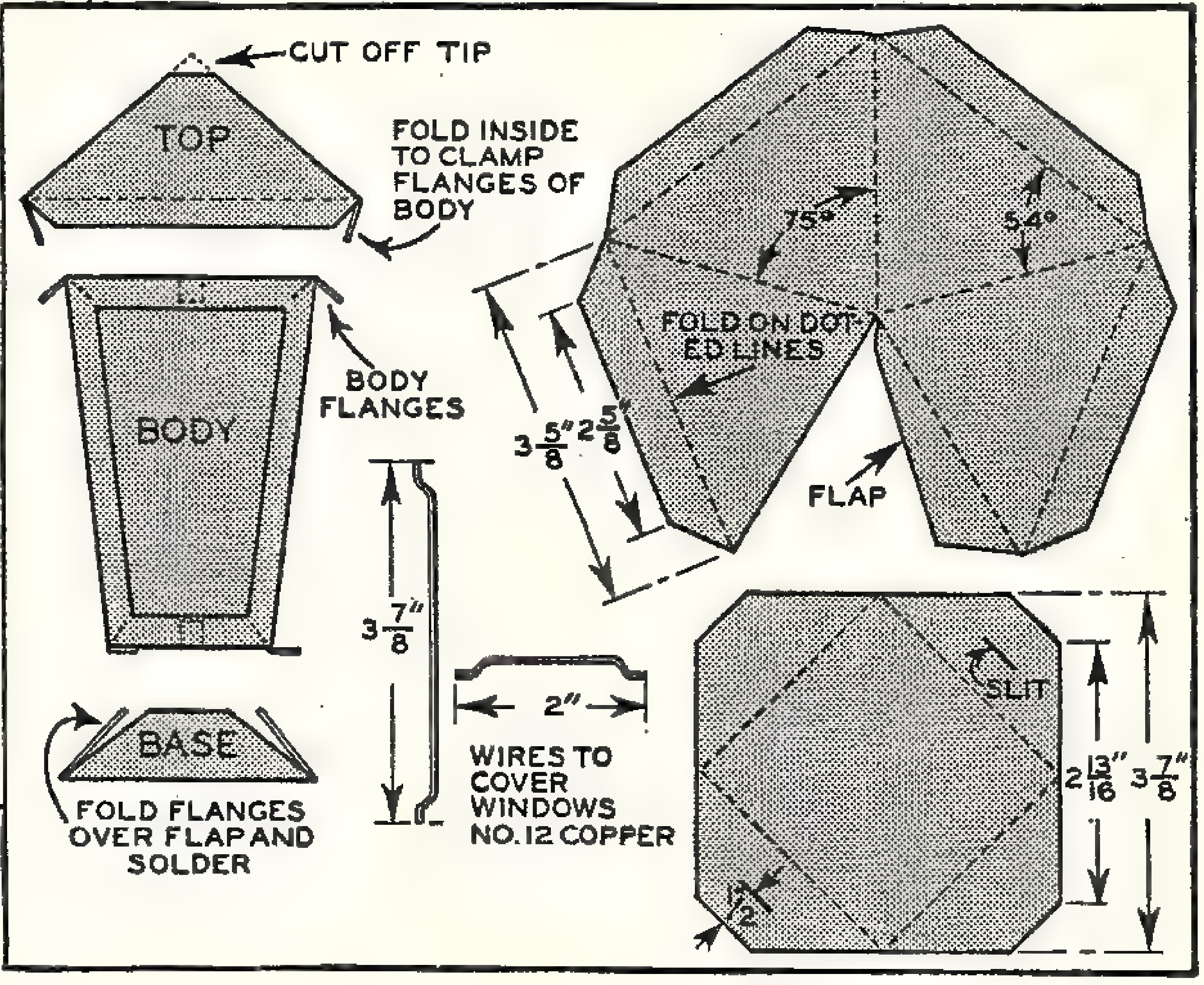


Photo shows attractive type bracket to go with the picturesque lamp. In finishing, give the metal two coats of antique bronze paint, allow to dry, then dab little green. At right are patterns.




CUT OFF TIP
TOP
FOLD INSIDE TO CLAMP FLANGES OF BODY
BODY
BODY FLANGES
75°
54°
FOLD ON DOTTED LINES
FLAP
3 5/8"
2 5/8"
3 7/8"
2"
WIRES TO COVER WINDOWS NO. 12 COPPER
BASE
FOLD FLANGES OVER FLAP AND SOLDER
SLIT
2 13/16"
3 7/8"
1/2

A PAIR of lamps of the old-fashioned lantern type like the one pictured above makes a practical and attractive fixture to grace the mantel of an open fireplace, or to serve as a night light in a bedroom or hallway. If, however, you are on the lookout for a scheme to earn some extra cash, here is just the thing, for any man proud of his home will welcome such an ornamental and attractive little fixture.

Construction is quite simple. First of all draw the three patterns for the top, the body and the base on a sheet of cardboard according to the designs shown above. These can then serve as templates for any number of lamps you can turn out in your workshop. Place these templates on a smooth sheet of galvanized iron and outline all the parts on the metal with a pencil. Then with a pair of tin snips cut out all the metal parts, closely following the outlines.

Fold Patterns on Dotted Lines

Now take up the body. With a strong pair of pliers and a vise, fold the sections on the dotted lines towards each other so as to resemble a square tube. Bend the narrow flange on the end inward and solder to the other end. Do likewise with the top. Fold the four sections on the dotted lines and solder the flange to the underside of the other edge. The base is also bent up on the dotted lines. Note that two of the flaps have slots, which are to take the flaps on the bottom of the body. The four pointed corners are then given a graceful curve by shaping them over a piece of pipe or iron rod.

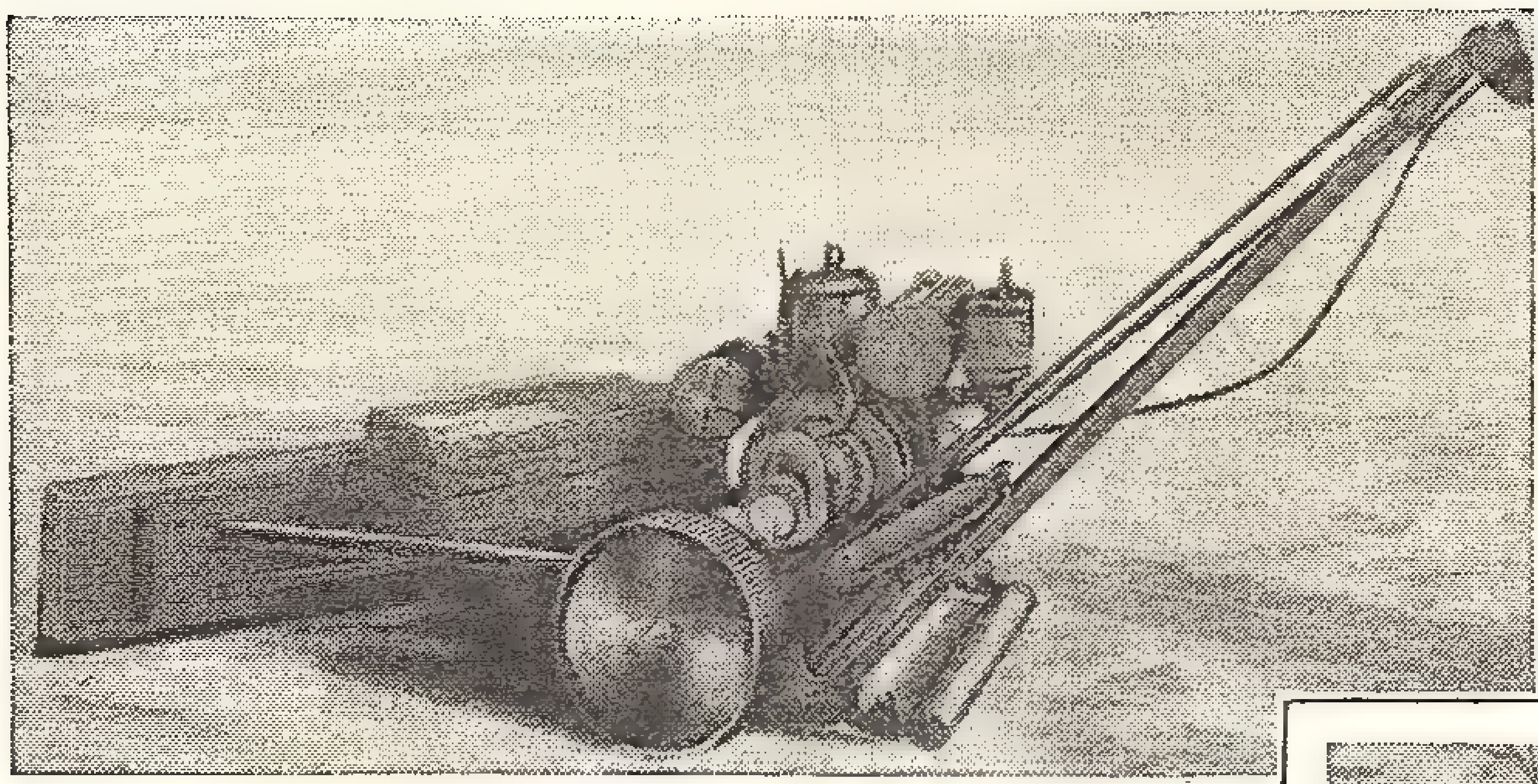
Now for the assembly. At the upper part of the body are four flanges which are bent outward on the dotted lines until they match the angle of the roof. The small tabs in the center of each flange are bent to the inside and serve to hold the glass in place. Those tabs and the small end of the body are also bent inwards, except the two which are slit in half. One half of these is bent inwards, the other half being bent at right angles on the outside to enter the slot in the base.

Guards Made From Copper Wire

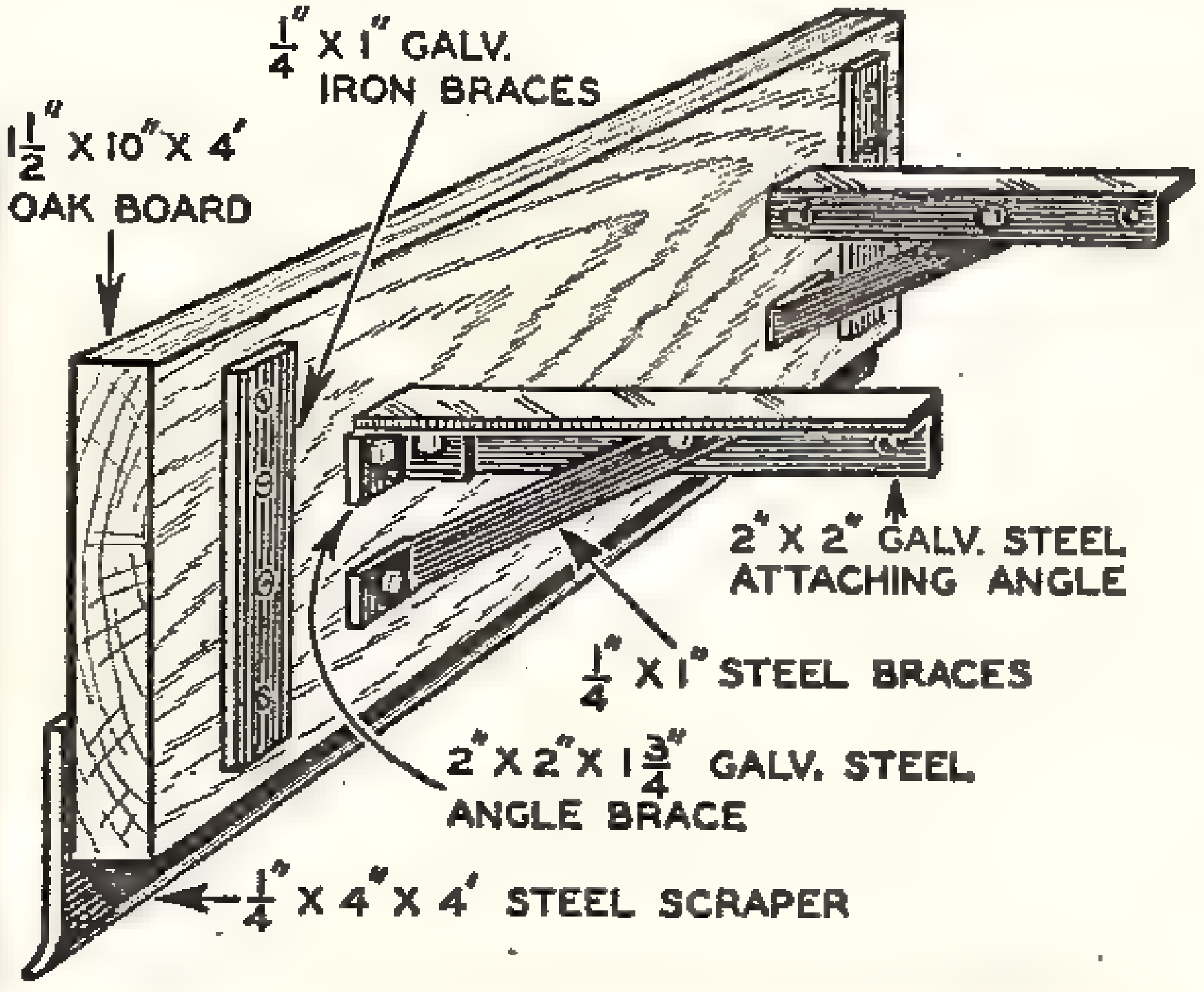
The guards over the lamp are made from copper wire, soldered in the positions shown. Cut the pointed tip off the top and solder into the hole a brass ring of the type used in sockets of drop lights. Four pieces of stained amber glass are fitted into the lamp and are held by the tabs. Finally screw a miniature keyless socket on the threaded shank of the brass ring and insert a bulb.

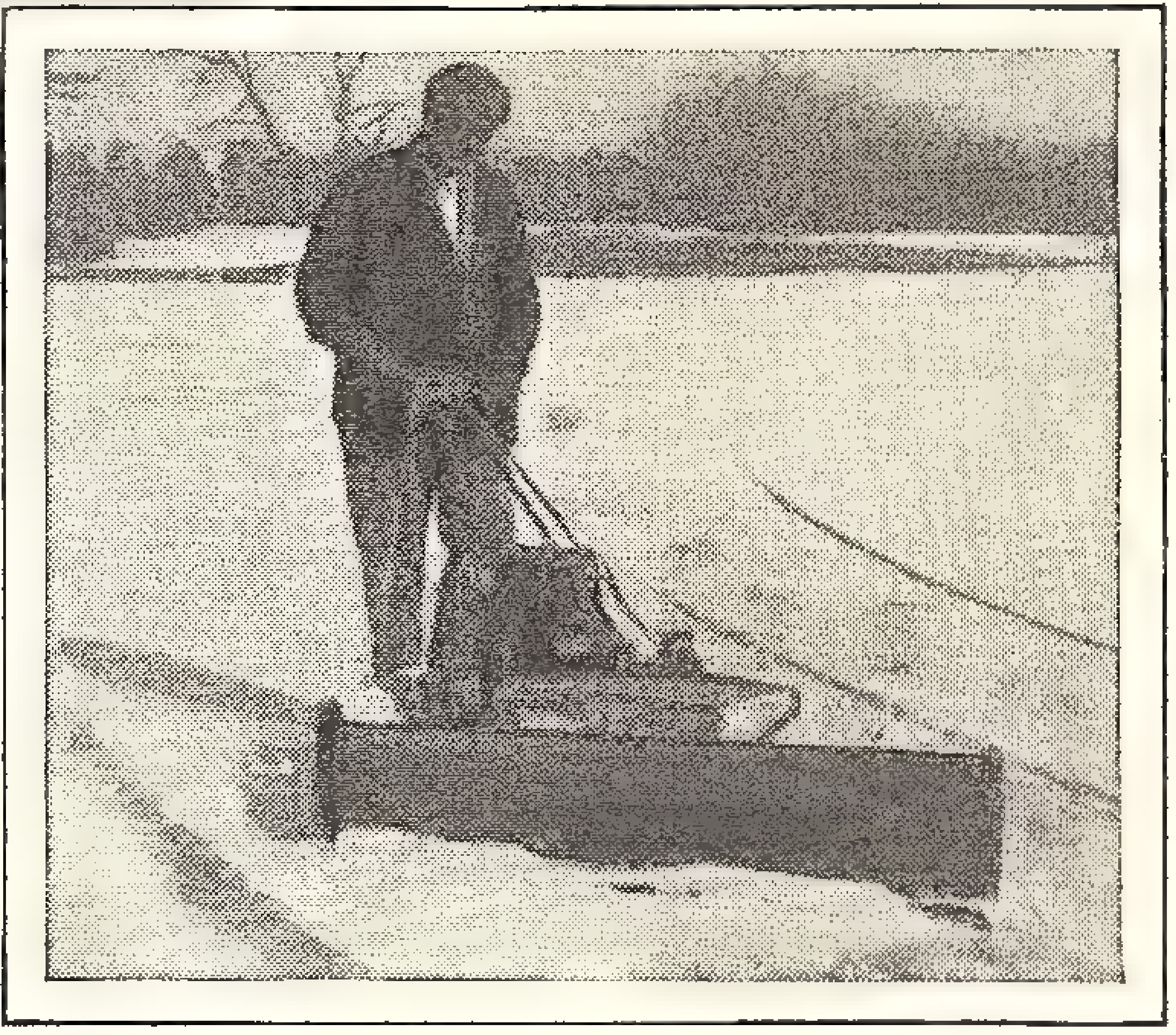
The lamp is finished with two coats of antique bronze, allowed to dry, then dabbed with paint to simulate oxidation.

Power MOWER Cleans Snow Off Rink



The motorized scraper ready for action. Note that the blades are weighted down with stones to hold the cutting edge firmly against the ice. The mower knives should be thrown out of gear to relieve the load.


1/4" x 1" GALV. IRON BRACES
1 1/2" x 10" x 4' OAK BOARD
2" x 2" GALV. STEEL ATTACHING ANGLE
1/4" x 1" STEEL BRACES
2" x 2" x 1 3/4" GALV. STEEL ANGLE BRACE
1/4" x 4" x 4' STEEL SCRAPER



Drawing at top shows construction of scraper. Length of attaching angles should be such that the blades are set at an angle of about 30 degrees to the face of mower as shown in lower photo. Put a scissor edge on the scraper.

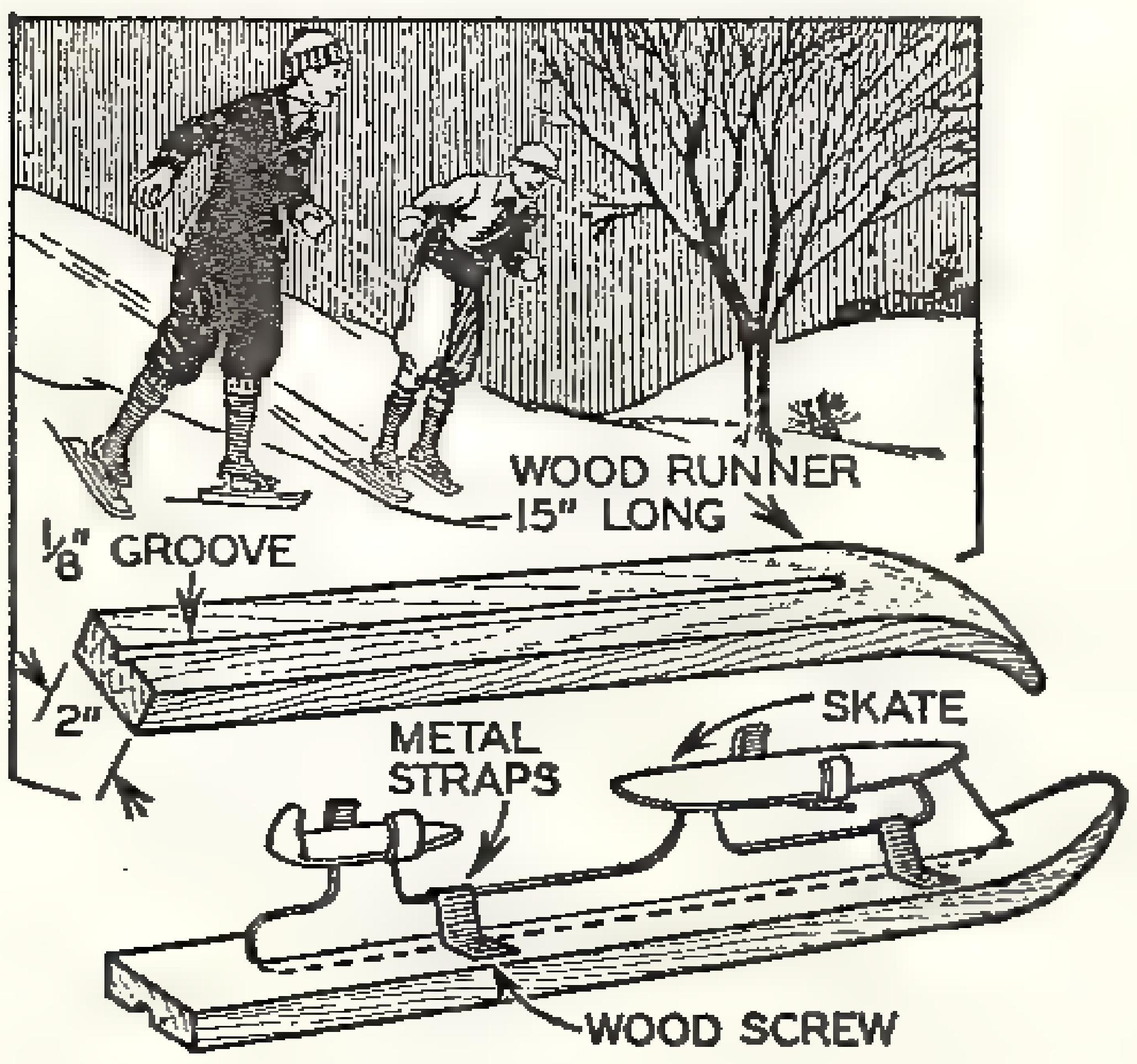
IN DENVER, Colorado, the Park Department has devised a method of clearing the snow from ice skating rinks with the aid of a small power lawn mower. A weighted scraper is attached to the front of the mower, which is driven over the ice under its own power.

The revolving knives of the mower are thrown out of gear so as not to impose additional load. A mower equipped in this manner will clear away the snow in about one-tenth the time required when hand scrapers are used.

You can make and attach the scraper to almost any standard type power mower quite easily. Make the body of the scraper from an oak board 1½"x10"x4'. You can make the blade of a piece of steel ¼"x4"x4'. File a scissor type sharp edge on the blade and attach it to the board with several wood screws. The blade should be curved outward. Attach the scraper to the mower with the braces and attaching angles shown in the drawing. The lengths of the main angles will depend on the type mower which you will use. One of these must be shorter than the other so that the scraper will set at an angle of about 30 degrees to the face of the mower.

When the machine is ready for use, place enough weights in the form of large stones or pieces of iron across the main angles to hold the blade down against the ice. Start the motor and, beginning at the center of the space to be cleared, run in over-lapping circles so as to push the snow away from the center and towards the edges as each circle is completed.

When the snowfall has been unusually heavy, it may be necessary to cart away a part of the snow, as the scraper piles it up in heaps too large to be pushed aside with the mower.



Shape the runners as shown here and attach to the skate with metal straps.

New Winter Sport—Coasting on Snow Skates

HERE'S the latest winter sport contrivance—a pair of snowskates that will permit you to dash about over the hard surface of frozen snow just like you zip around over a sheet of ice on a lake. First you'll have to be willing to sacrifice your skates, since they have to be bolted to a pair of runners as illustrated in the accompanying drawing. These runners are simply two pieces of hard wood, two inches wide and fifteen inches long, shaped as illustrated. A groove one-eighth inch deep runs along the underside. When the shaping is completed the runners are secured to the skates with metal straps bent over the runner and fastened down with two screws. If you wish you can make the runners slightly longer so they will act as a pair of skis.—Bob Paulson.

“ALL SORTS”—an ALL-

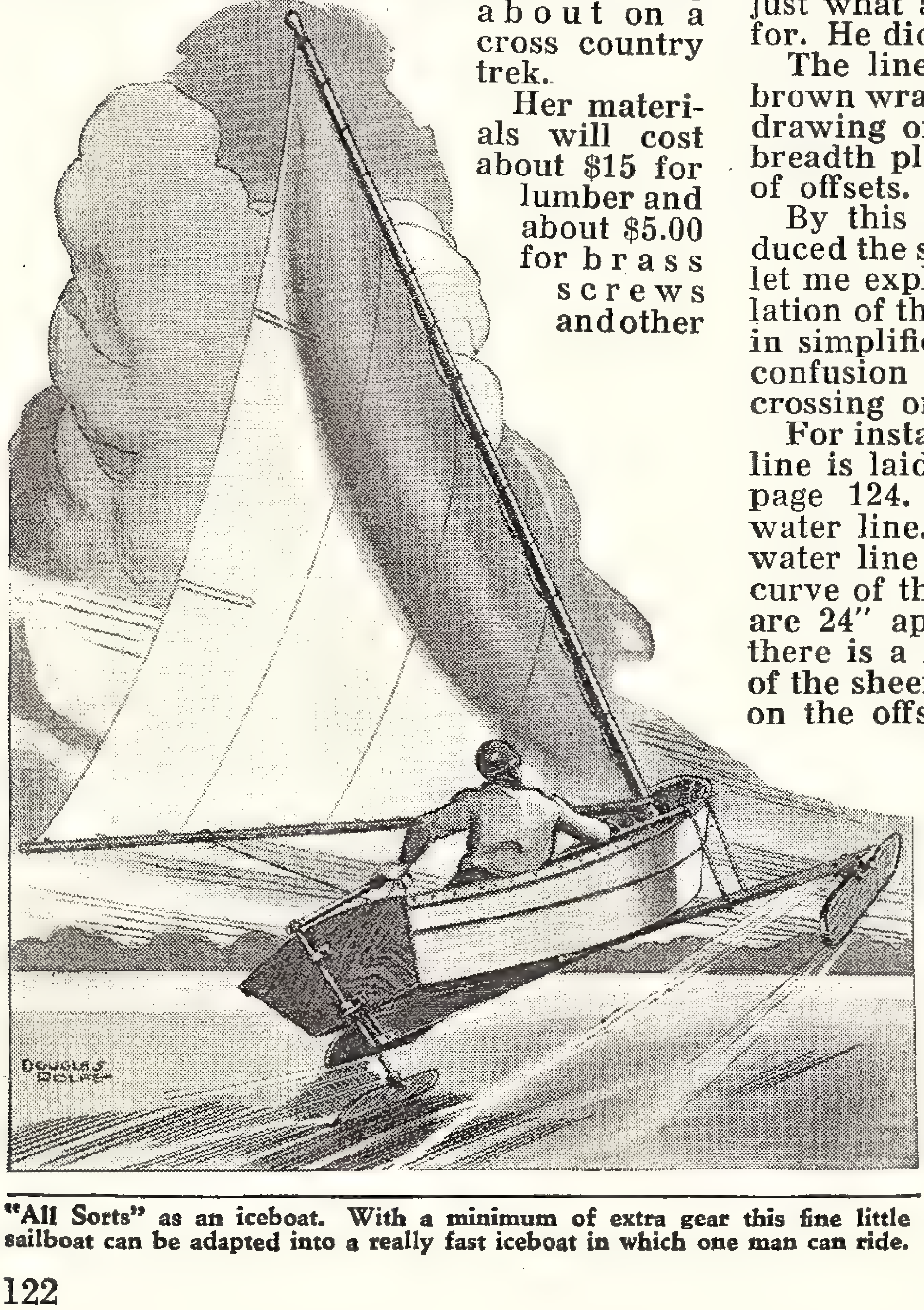
This is a he man’s boat suitable for any kind of service—row it, power it with an outboard, sail it, or adapt it to iceboat service with its clever fitments. “All Sorts” is in keeping with the times—she gives you more for your money.

SOME years ago I built a little boat that was quite dandy for use as a dinghy. She was a combination sailer, rowboat, or tender. Being portable she could be thrown onto any old pair of wheels and be trekked to parts unknown for high adventure.

As I used her I found that this point could be improved, and that point, and so I resolved one afternoon while sailing on Ottertail Lake in Minnesota to “git behind th’ new project an’ shove.” So I did. The resulting design is shown right here. Her name is “All Sorts.”

This final evolution is a grand little boat. She is ten feet long, and 44 inches beam—very generous width for a boat so small. She will weigh less than 60 lbs. and is therefore portable. Because of her construction, which is typical of the Long Island longshore boats, she is very very rigid and stiff and will take a lot of jumping and knocking about on a cross country trek.

Her materials will cost about $15 for lumber and about $5.00 for brass screws and other hardware. The sail can be had here for ten bucks if you want to buy a brand new one from the magazine, and the iceboat attachment will cost according to the going wages for local blacksmithing in your community.



“All Sorts” as an iceboat. With a minimum of extra gear this fine little sailboat can be adapted into a really fast iceboat in which one man can ride.

“All Sorts” lays her chief claim to fame in her versatility. She is at once a portable fishing and rowing skiff, or an excitingly capable little sailboat, or an outboard, or an iceboat.

Here is how she was built.

After the idea was reduced to drawing form, I decided to build one of these little critters to see how she’d work out. At the Mechanical Package Magazine Experiment Station Sam Wing and Maurie Lonn were equipped for a job like this, and I asked my brother editor, Don Cooley, who runs this yere M-M book, if he didn’t think he’d like to build up “All Sorts” to show his readers just what a swell little boat could be used for. He did. So we started work.

The lines were laid down full size on brown wrapping paper. In other words the drawing of the sheer profile and the half breadth plan were laid out from the table of offsets.

By this means the drawing was reproduced the size of the boat. The offsets table, let me explain, is no mystery. It is a tabulation of the dimensions of the frames done in simplified style. Thus it avoids a lot of confusion of dimensions crossing and recrossing one another.

For instance, you can see where the baseline is laid out on the profile drawing on page 124. Six inches above this is the water line. Then six inches above this is water line No. 1. The dimensions for the curve of the stem are shown. The stations are 24" apart. On each of these stations there is a *height.* For instance the height of the sheer line at station No. 1 reads 1-8-4 on the offsets table. This means that the dot through which the sheer line must pass on station 1 is 1 ft. 8 ins. and 4/8" (or ½" in other words) from the baseline.

At station 2, the height of the sheer above the baseline is 1-5-5, or 1 ft., 5 ins. and 5/8" as all dimensions in the table are ft.—ins.—8ths.

By following out this reading of the offsets table the full size set of lines is laid down.

These lines must be laid down. One cannot build a fair boat without the full size line drawings.

PURPOSE BOAT

by WESTON FARMER

The inset shows "All Sorts" as a plain tender or dinghy. As such she'll make a portable little rowboat or fishing boat. Left center shows her with two aboard sailing on The Lake of the Isles, Minneapolis. She furnishes splendid sailing.

One word of explanation: If the batten you use to draw around will not bend through each point given in the offset table *fairly,* average the lineup—fair it up—the offset table can be and very often is wrong. The whole purpose of the laying out is to fair the boat up on your own floor before you use the full size drawing for patterns for the molds and for the stem.

Stem Is Next

When the lines are laid out, cut out the stem just as we did. This is a piece of 1¾" thick white oak. A piece 1¾" by 8" by 2' will give a piece for the stem. Lay this piece under the lines drawing and drive brads through the stem profile. Then pull the brads out. This will show a pattern of nail holes which can be sawed to shape on a bandsaw, or by hand.

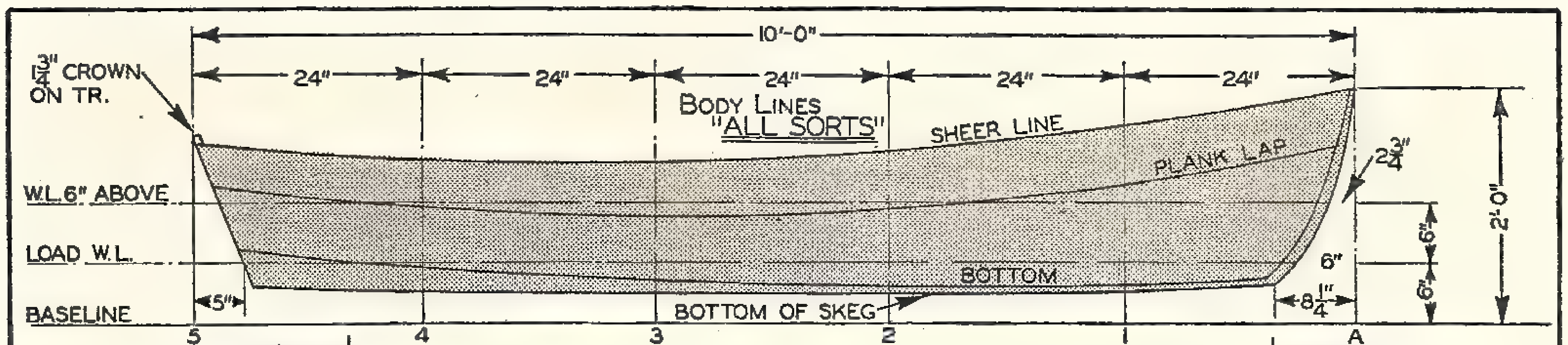
Then cut in a rabbet, just as we did, by making a fid as it is called, just the thickness of the topside planking of the boat, and setting it into the wood at the right angle, the depth equal to the thickness of the planking.

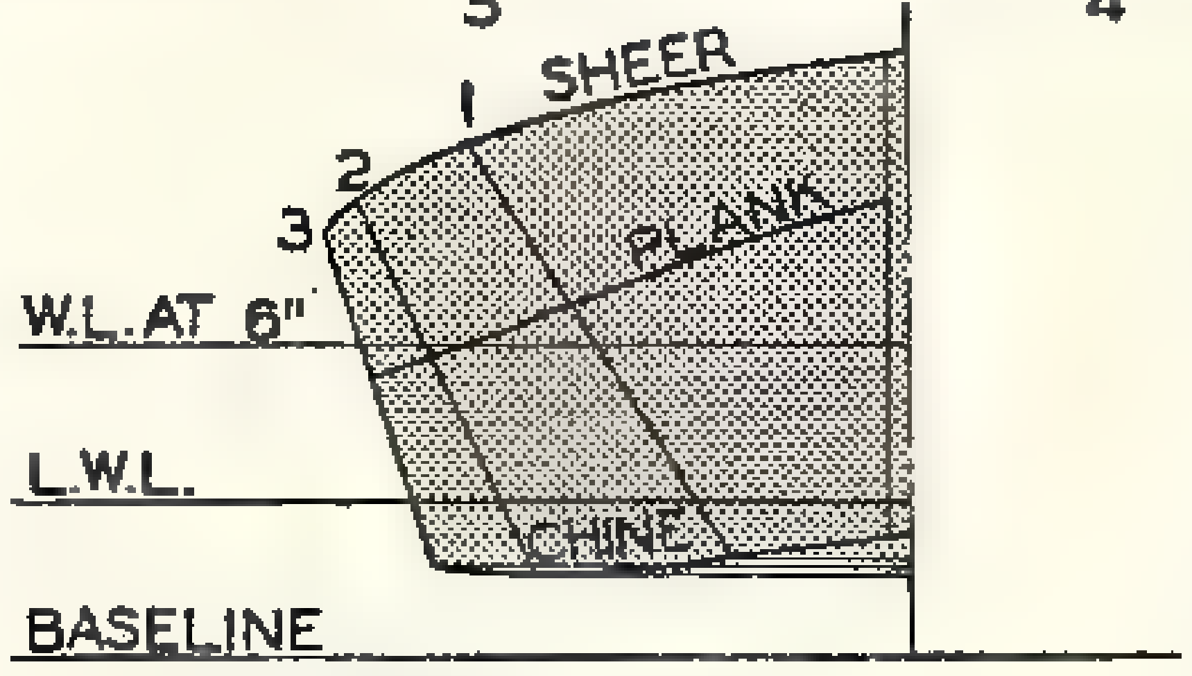
The author at the left and Hudson Keith, of the Packmag Experiment Station, launch the boat at the door of the Station. Just like dunking a doughnut!

Next, as shown in Fig. 1, arrange a strongback of 2x12" scrap lumber which is fairly straight. Space off the stations, and make temporary molds from the lines drawings of the sections. It is around these molds that the planking is bent. The thickness of the planking, ½", must be subtracted all around the mold, as the drawing is to the outside of the hull. Then your setup will look like the photo, Fig. 2.

The transom is made of ¾" mahogany or oak, well cleated together and fastened

Lines and Offsets Show Hull; Details Show Iceboat Appurtenances

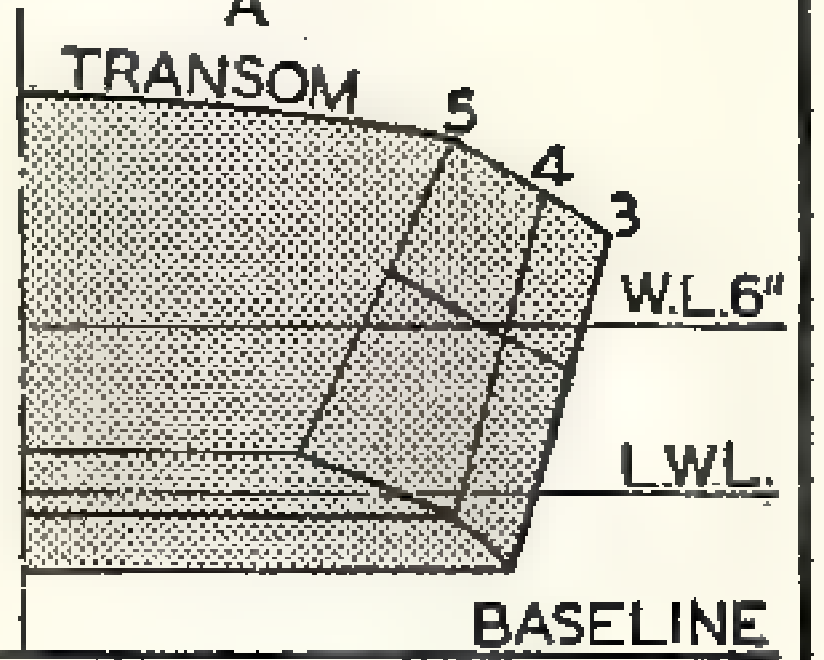

10'-0"
24"
24"
24"
24"
24"
$1\frac{3}{4}$" CROWN ON TR.
BODY LINES "ALL SORTS"
SHEER LINE
PLANK LAP
$2\frac{3}{4}$"
2'-0"
6"
6"
6"
$8\frac{1}{4}$"
W.L. 6" ABOVE
LOAD W.L.
BOTTOM
BASELINE
5"
BOTTOM OF SKEG
5
4
3
2
1
A


SHEER
PLANK
CHINE
1
2
3
W.L. AT 6"
L.W.L.
BASELINE

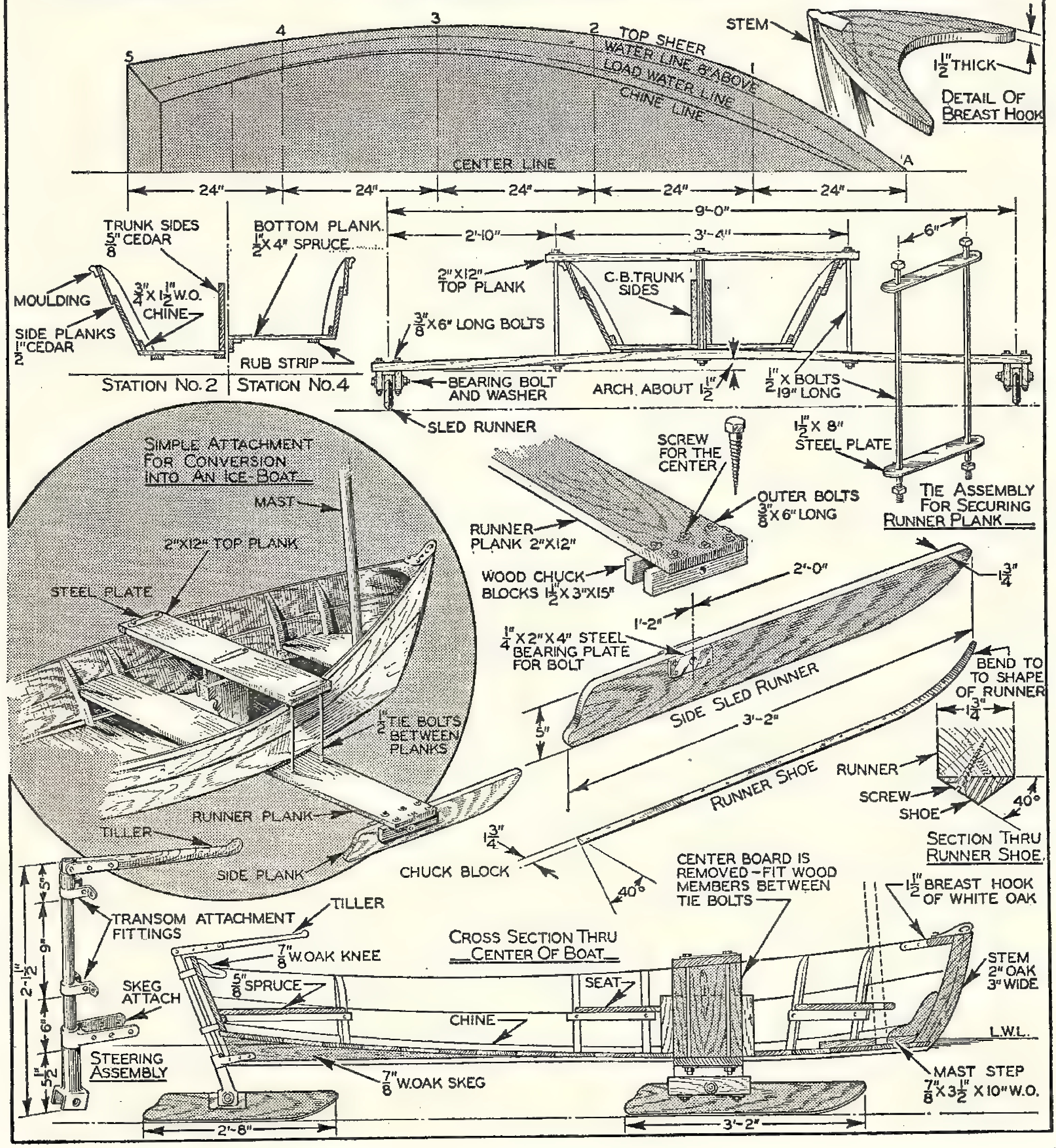
SECTIONS FORWARD OF STATION No. 3

	HEIGHTS ABOVE BASELINE					WIDTHS FROM CENTER LINE				
STATION	1	2	3	4	5	1	2	3	4	5
SHEER	1-8-4	1-5-5	1-4-4	1-4-7	1-6-4	1-2-4	1-8-6	1-10-0	1-8-2	1-4-2
PLANK	1-2-3	0-11-4	0-11-0	0-11-6	1-2-0					
W.L. 6"	1-0-0	1-0-0	1-0-0	1-0-0	1-0-0	0-11-5	1-6-4	1-8-7	1-6-0	
L.W.L.	0-6-0	0-6-0	0-6-0	0-6-0	0-6-0	0-8-0	1-4-0	1-7-0	1-4-2	
CHINE	0-4-4	0-3-7	0-4-4	0-5-6	0-7-5	0-6-5	1-2-5	1-6-2	1-3-6	0-10-6

NOTE:- DIMENSIONS ARE IN FEET INCHES AND EIGHTS
ALL DIMENSIONS ARE TO OUTSIDE OF PLANKING


TRANSOM
5
4
3
W.L.6"
L.W.L.
BASELINE

SECTIONS AFT OF STATION No. 3


5
4
3
2
1
A
TOP SHEER
WATER LINE 6" ABOVE
LOAD WATER LINE
CHINE LINE
CENTER LINE
24"
24"
24"
24"
24"
STEM
$1\frac{1}{2}$" THICK
DETAIL OF BREAST HOOK
TRUNK SIDES $\frac{5}{8}$" CEDAR
BOTTOM PLANK $\frac{1}{2}$"X4" SPRUCE
MOULDING
$\frac{3}{4}$"X$1\frac{1}{2}$" W.O. CHINE
SIDE PLANKS $\frac{1}{2}$" CEDAR
RUB STRIP
STATION No. 2
STATION No. 4
9'-0"
2'-10"
3'-4"
6"
2"X12" TOP PLANK
C.B. TRUNK SIDES
$\frac{3}{8}$"X6" LONG BOLTS
BEARING BOLT AND WASHER
ARCH ABOUT $1\frac{1}{2}$"
$\frac{1}{2}$"X BOLTS 19" LONG
SLED RUNNER
$1\frac{1}{2}$"X 8" STEEL PLATE
TIE ASSEMBLY FOR SECURING RUNNER PLANK
SCREW FOR THE CENTER
OUTER BOLTS $\frac{3}{8}$"X6" LONG
RUNNER PLANK 2"X12"
WOOD CHUCK BLOCKS $1\frac{1}{2}$"X3"X15"
SIMPLE ATTACHMENT FOR CONVERSION INTO AN ICE-BOAT
MAST
2"X12" TOP PLANK
STEEL PLATE
$\frac{1}{2}$" TIE BOLTS BETWEEN PLANKS
RUNNER PLANK
TILLER
SIDE PLANK
2'-0"
$1\frac{3}{4}$"
1'-2"
$\frac{1}{4}$"X2"X4" STEEL BEARING PLATE FOR BOLT
SIDE SLED RUNNER
3'-2"
5"
BEND TO TO SHAPE OF RUNNER
$1\frac{3}{4}$"
RUNNER
SCREW
SHOE
40°
SECTION THRU RUNNER SHOE
RUNNER SHOE
$1\frac{3}{4}$"
CHUCK BLOCK
40°
CENTER BOARD IS REMOVED - FIT WOOD MEMBERS BETWEEN TIE BOLTS
$1\frac{1}{2}$" BREAST HOOK OF WHITE OAK
5"
9"
$2\frac{1}{2}$"
6"
$5\frac{1}{2}$"
TRANSOM ATTACHMENT FITTINGS
TILLER
$\frac{7}{8}$" W.OAK KNEE
SKEG ATTACH
STEERING ASSEMBLY
CROSS SECTION THRU CENTER OF BOAT
$\frac{5}{8}$" SPRUCE
SEAT
CHINE
STEM 2" OAK 3" WIDE
L.W.L.
$\frac{7}{8}$" W.OAK SKEG
MAST STEP $\frac{7}{8}$"X$3\frac{1}{2}$"X10" W.O.
2'-8"
3'-2"

with 1" No. 7 brass screws. I suggest ½" by 2" cleats running around the edge of the transom, and the above fastenings used.

Chine Piece Is Next

Next you will bend in the ¾" by 1 ½" w. oak chine piece. This is screwed to the stem which has previously set in between the members of the strongback.

The chines are fastened both at the same time with 1½" No. 8 brass screws, well countersunk. Then the pieces are sprung back around the molds which have a ¾"x1¾" notch cut in them at the proper bevel to let the chine pieces in. The chines are set into the cleats on the transom. If you find the wood will bend easier toward the bow, you can taper the pieces the flat way down to ½" thickness.

Then the side planking goes on. The larger pieces at the bottom go on first, then the top or sheer strakes, as they are called.

Along the chine at 2" intervals the bottom planking is fastened with ¾" No. 7 brass screws.

The seam here should be payed with C quality Jeffery's marine glue from an ordinary oil can. Just a thread should be payed out between the surfaces as the plank is screwed home. The glue will first spread of its own accord and then will dry in a rubbery plastic state which will keep all water out. This treatment is necessary in a small boat which is in and out of the water a lot.

Where the top and bottom strakes of planking lap, especially amidship, it will be well to bevel the bottom strake a little so that the seam is flush when the top strake is fastened on.

The top strake is screwed at the frame with ¾" screws, and between frames it is fastened with copper covered clout nails 1⅛" long. These can be had at or through your local hardware store. If they haven't them in stock they can get them for you.

Plane off the planking flush with the chine piece and then you are ready for the bottom.

These are pieces of spruce ½"x4" in width. Spruce or cypress is the only wood to use here. Pine is too soft and will pull the fastenings.

The planking is started at the bow, and worked aft. See Fig. 3. There is about 1/16" opening or outgauge left in the seams of the bottom planks and the seam is payed with a bead of Jeffery's C Quality marine glue.

After sanding, the boat is taken off the molds and looks as shown at Fig. 4.

Next the trim such as gunwale, oarlock pads, centerboard trunk (see Fig. 5 and Fig. 6) are put in. The gunwale is riveted with No. 10 copper rivets over burrs. At this stage the boat, ready for the mast rudder or iceboat attachments, looks like drawing on page 124.

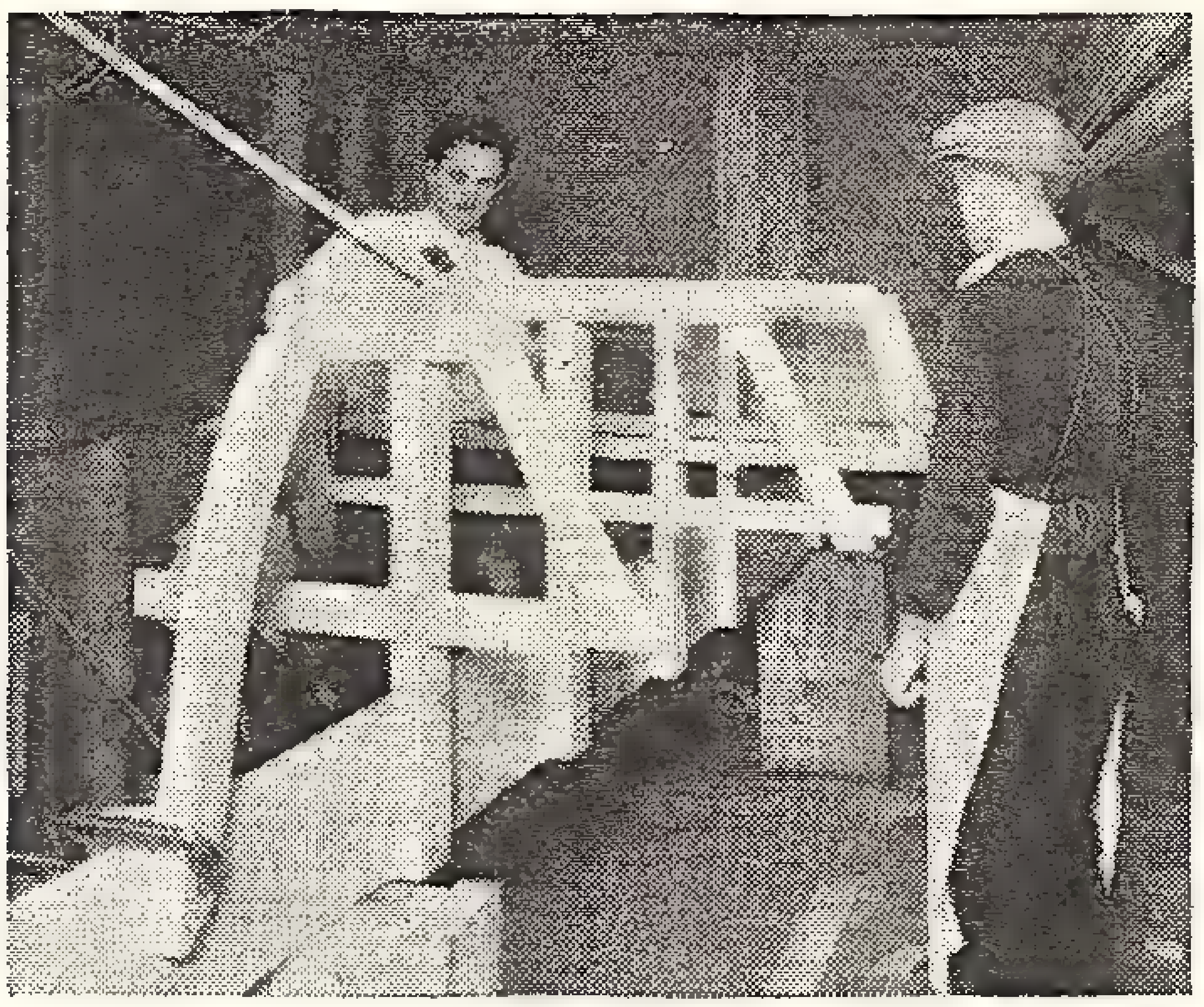


Fig. 1. Showing how stem and the molds are set up on a strongback after the molds have been made from the full sized lines drawing you make from the table of offsets.

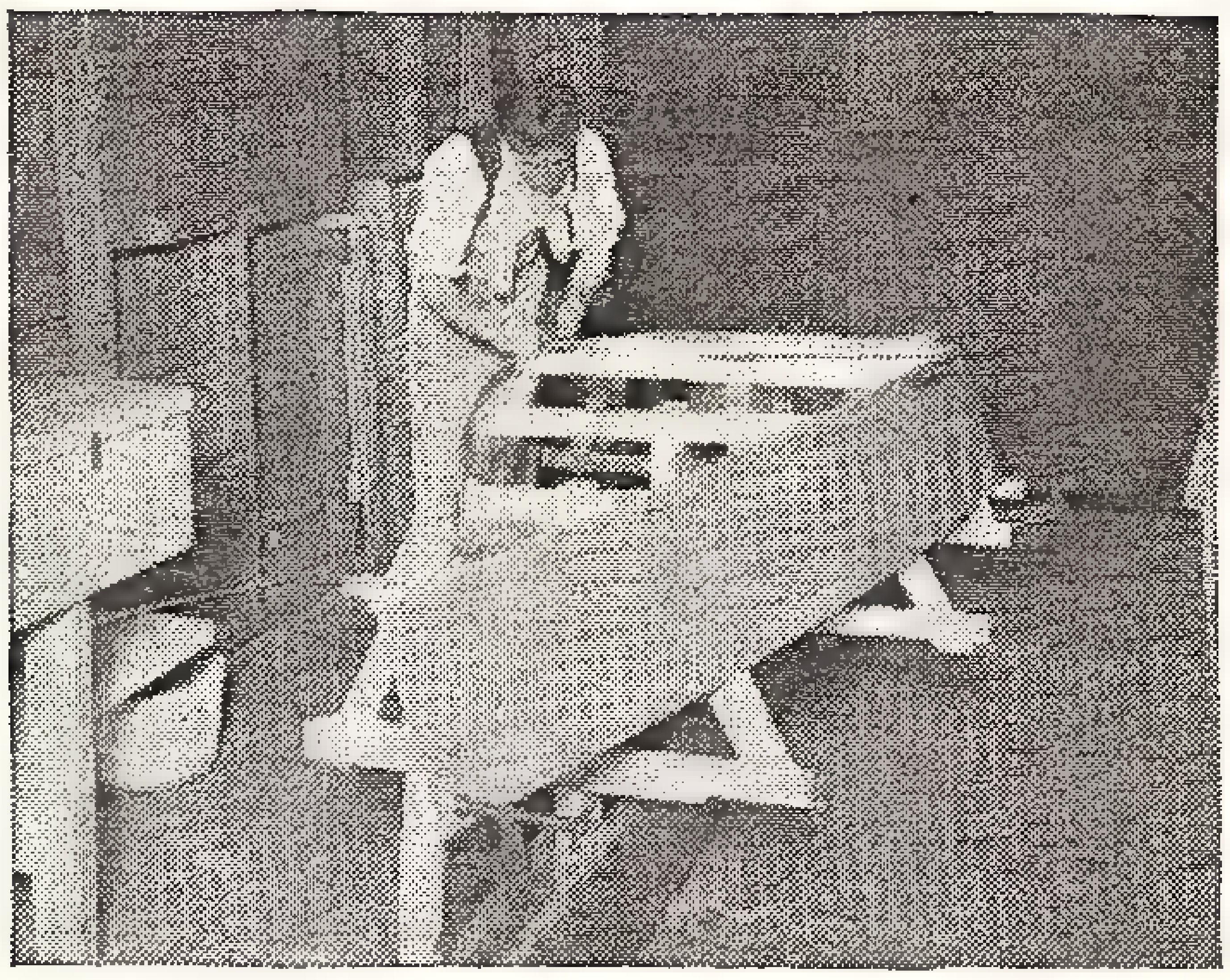


Fig. 2. The strongback is lowered to the floor. Chine pieces put around the molds and fastened to the transom. Then the bottom strake of planking is bent around and cut to shape, later being fastened.

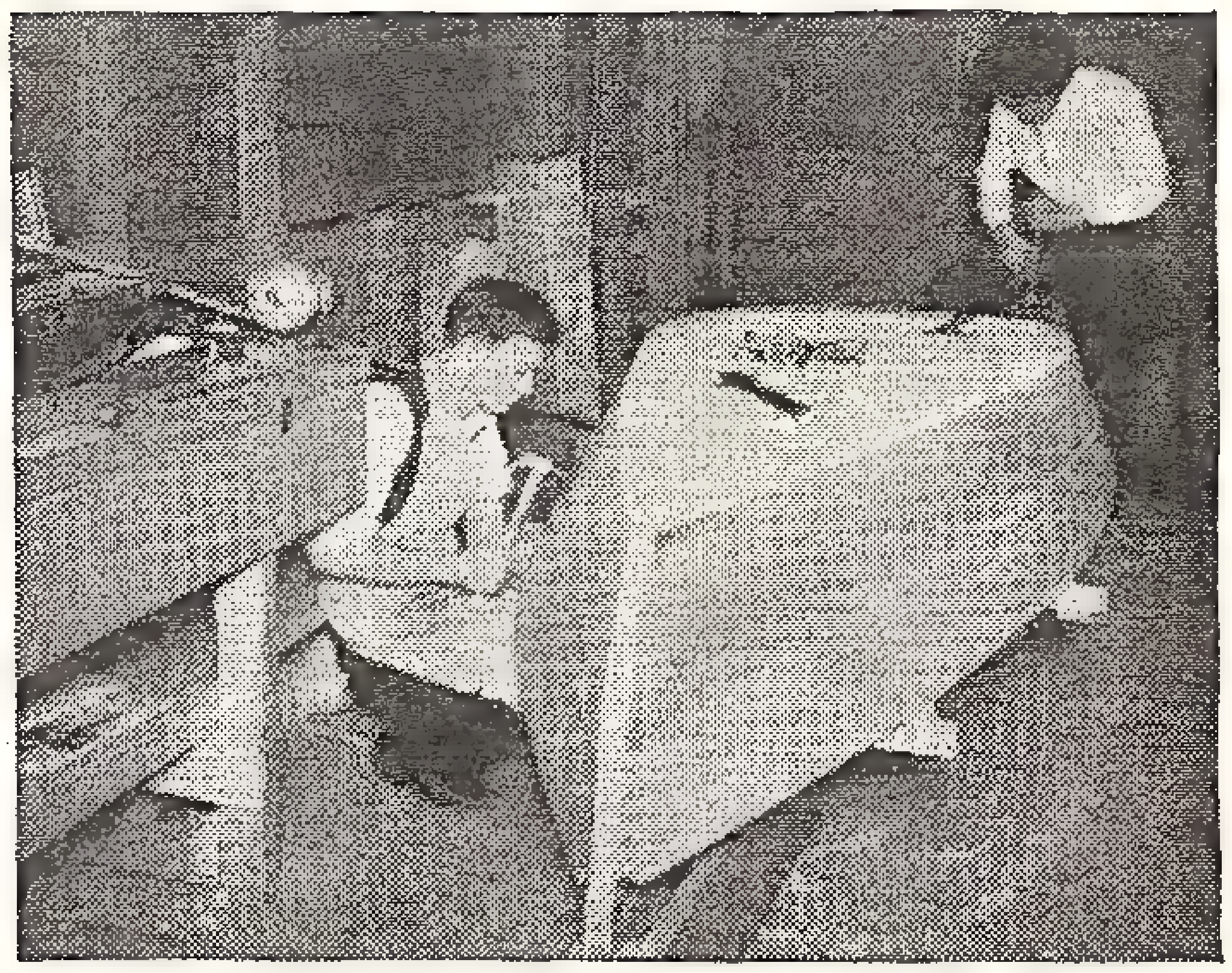


Fig. 3. How "All Sorts" looks when the topsides have been planked and the bottom is laid on athwartship, or "crosswise" as landlubbers say.

The center board is 30" long by 11" wide by ⅝" thick oak. In order to keep it sunk and in order to prevent it creeping up into the trunk while sailing, you should pour lead into a recess as the draw-

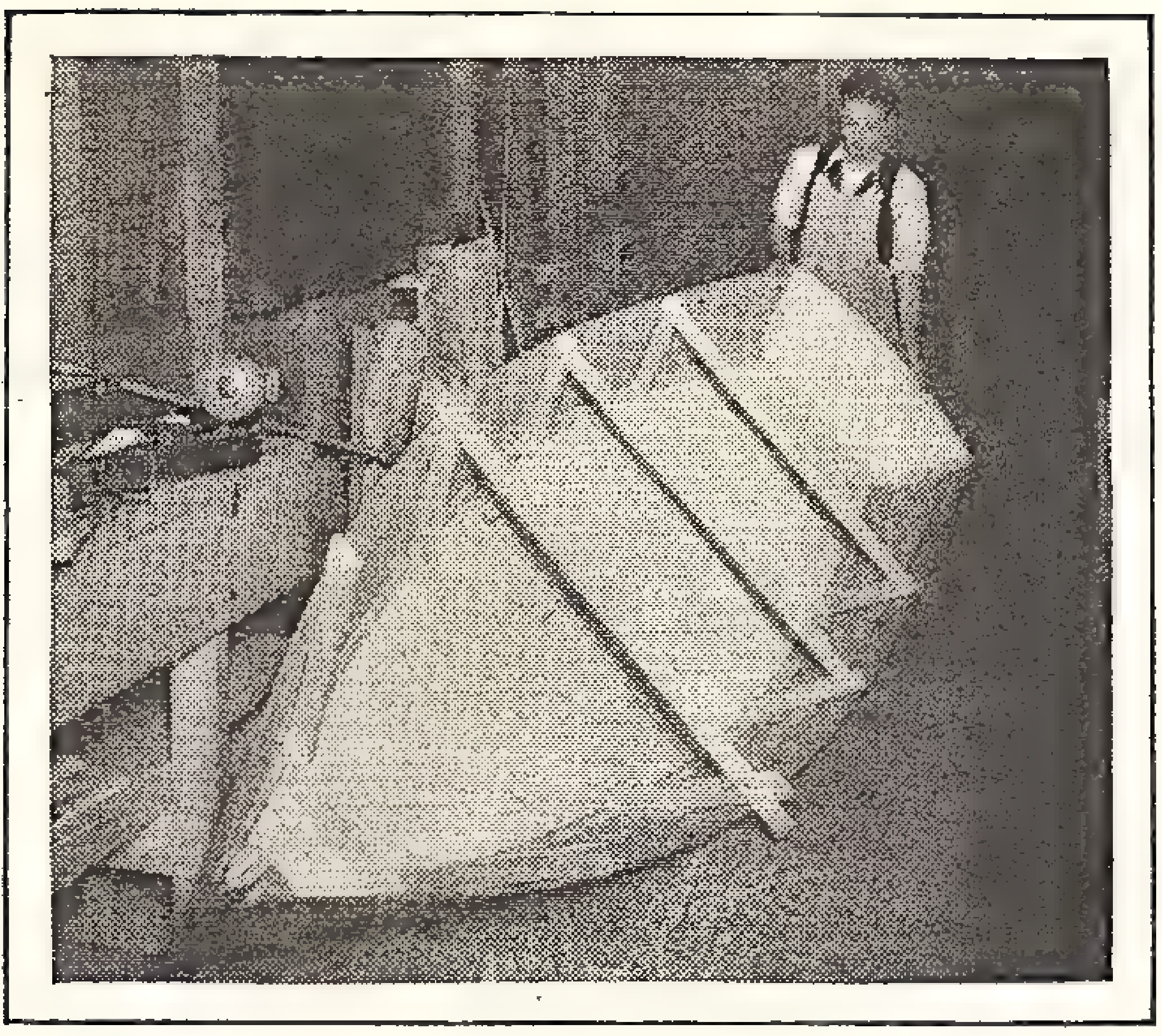


Fig. 4. The job has been sanded. The molds are knocked out. Here boat is being turned to light ready for operation.

ing in Fig. 6 so clearly explains.

The sail plan and all details of the sailing equipment are shown in that drawing.

The sail of 6 oz. canvas is something that better be bought. Of course, if you want to build it yourself there is nothing that will prevent you from doing it, but it will look like sin and will not have the proper draft. Sailmaking is an art, no less.

We can furnish this sail with all bolt ropes and the lacings for ten dollars. Not that we want to make a business of this sort of thing, but in times past we have had readers write in and be very disappointed with the results of their home-made sails, so we arranged with a well known sailmaker to handle the jobs and turn out the canvas for this figure.

If you try to make a sail at home here's what will happen. You will lay out the sail, cut the cloth, and like as not, without some article to help you place the selvages and the warps in the correct slant, the sail will sew up unevenly, and when the first tug of wind hits it it will pull unmercifully far out of shape. A six-ounce sail, which means that the cloth weighs six ounces to the yard, will be a hard thing to sew up straight, too.

Never yet saw an amateur sewn sail that was a credit. The idea that most anything that draws wind will sail is correct. The idea that most anything that will draw wind will sail *well* is not correct. A few bumps, a few unevennesses in the surface, and gone is the pulling power of the sheet.

Better let George do it and invest the price of a sail. This is not drumming—we make not a penny on the deal, but it is an earnest desire on our part to see the reader with a perfectly fitting suit of sails—and at prices that a year ago would have cost thirty dollars.

The same line of thought holds true of the matter of the bronze fittings used for the iceboat and the rudder fittings used for the sailboat. We can furnish the stuff here for about three dollars per set, and wish if you are building the boat that you'd address Sam Wing, 529 So. 7th St., for a quotation. It only costs a stamp.

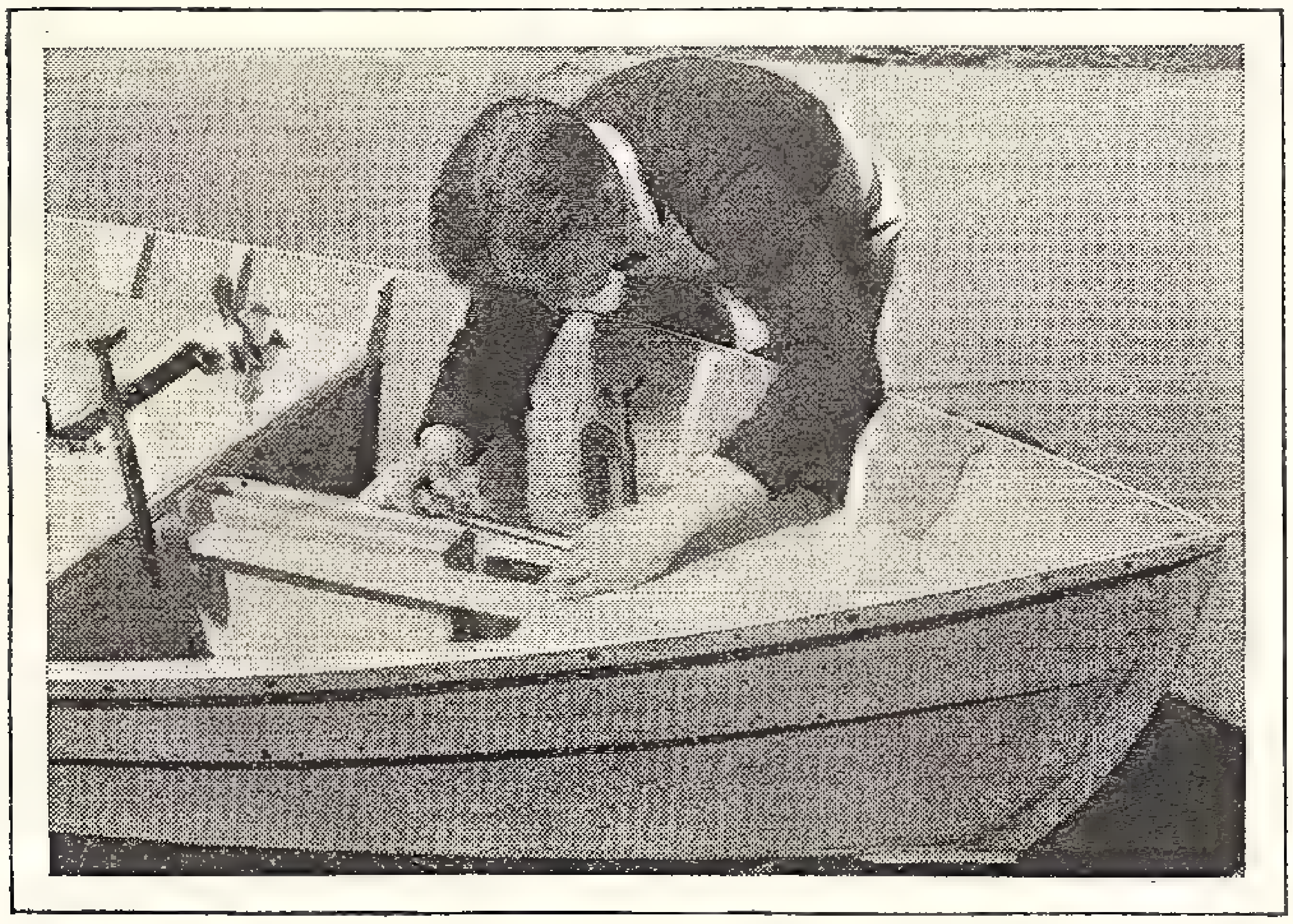
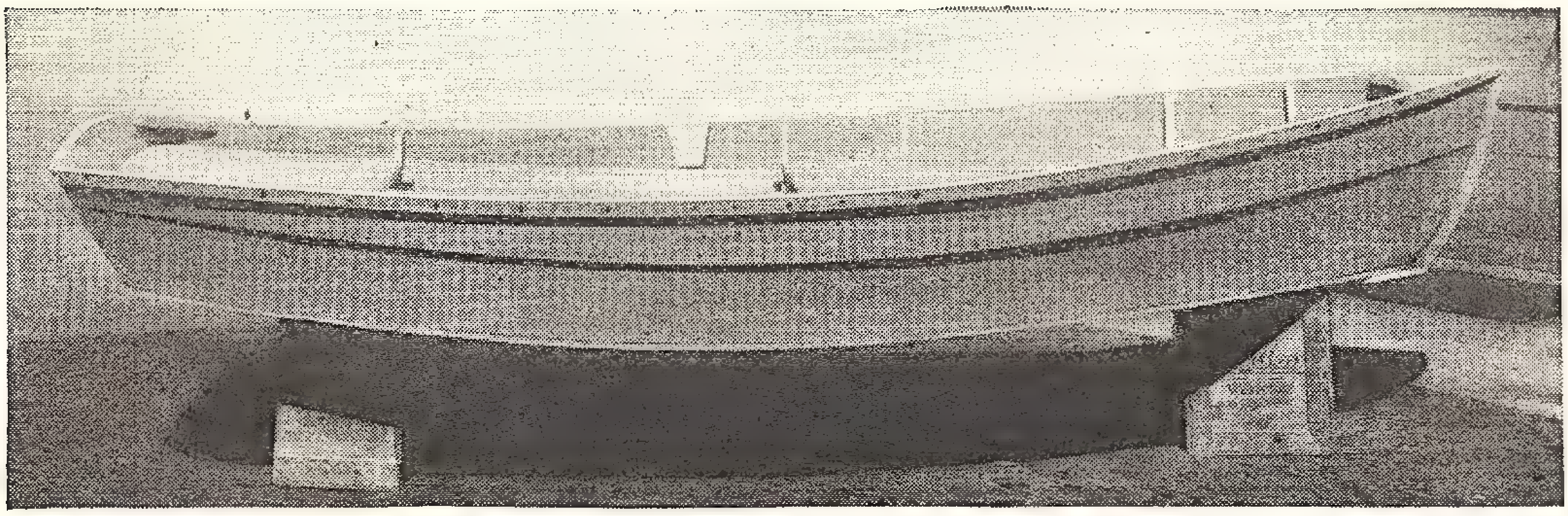


Fig. 5. Fitting in the centerboard and mast step at the Experiment Station. Note the use of C-clamps while setting down the brass screws.



Here is "All Sorts," right out of the shop. She in her simplest form is a good rowboat. Her simplicity and sturdiness are evident in this photo. We can furnish bronze fittings if you want 'em.

To add any explanation would be to gild the lily. All the running rigging should be ⅜" manila rope. The mast is stepped without stays, as it is a small stiff stick, and the arrangement described in the plans have proven very strong.

The iceboat details are shown in full explanation in the drawing on page 124 and show more clearly than words could just how the rear runner is attached in place of the rudder and how the cross beam is centered by a spud which fits into the centerboard trunk and a 2" by 12" sugar pine top plank to hold the tie rod bolts that go into the runner plank. Ice boat shoe details have been run so often in MODERN MECHANIX AND INVENTIONS that no further explanation is needed.

A small one or two cylinder motor of the A class will prove ample outboard power as a kicker for "All Sorts." Any kind of a pond is big enough to sail her on, as witness the pix of this little hooker as a sailboat. She will prove a fine dollar's worth for anybody, and the step by step pictures, with the complete drawings and outline of building procedure, should enable anyone with a little lumber, elbow grease and stick-to-it-iveness to build himself a boat that can do anything—an "All Sorts." Before you sit down to write concerning any point which is obscure to you in the building of this boat, think first. There was no wood burning in this office for anyone to smell while we were doping out the plans, and a lot of needless work is often caused by thoughtlessness.

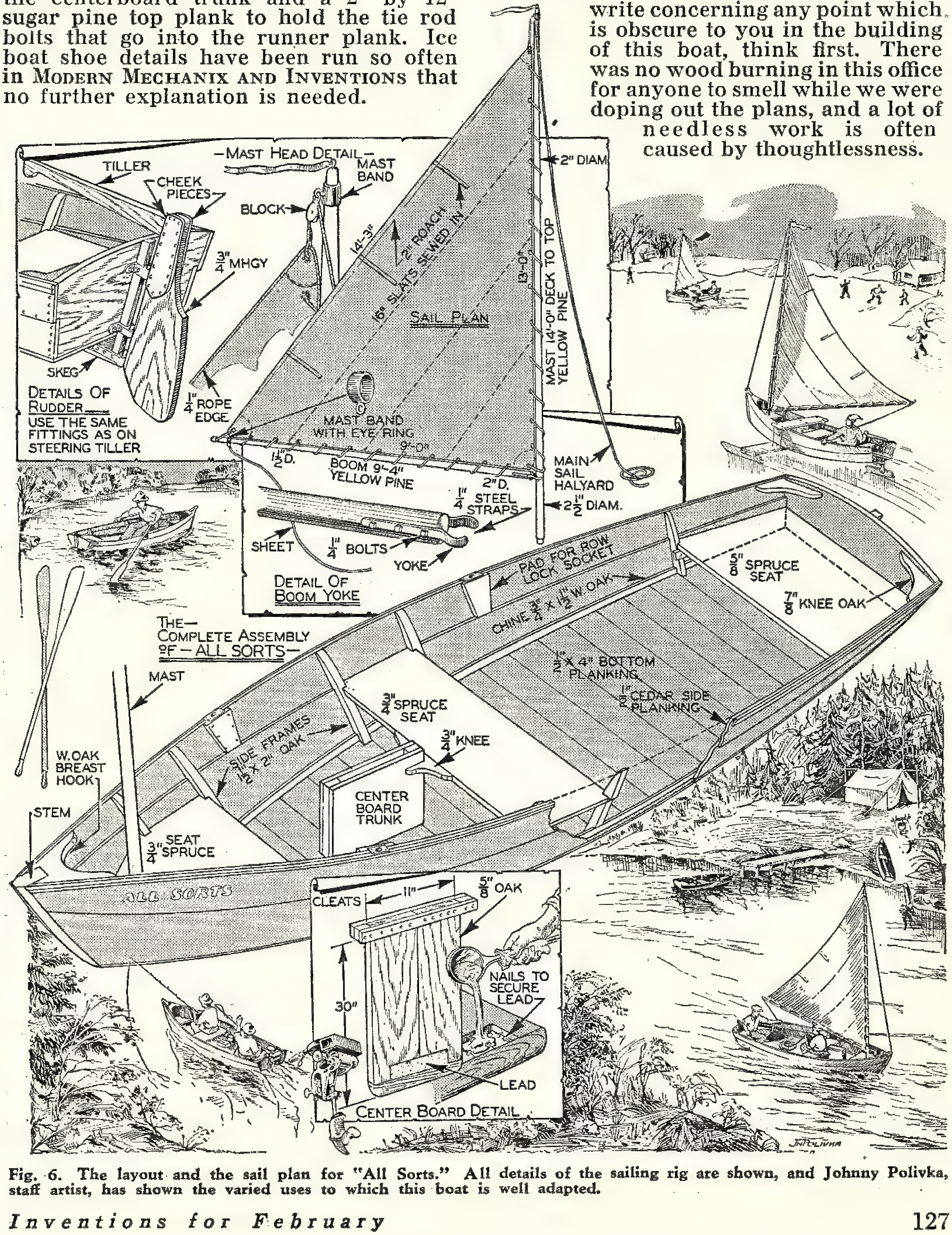
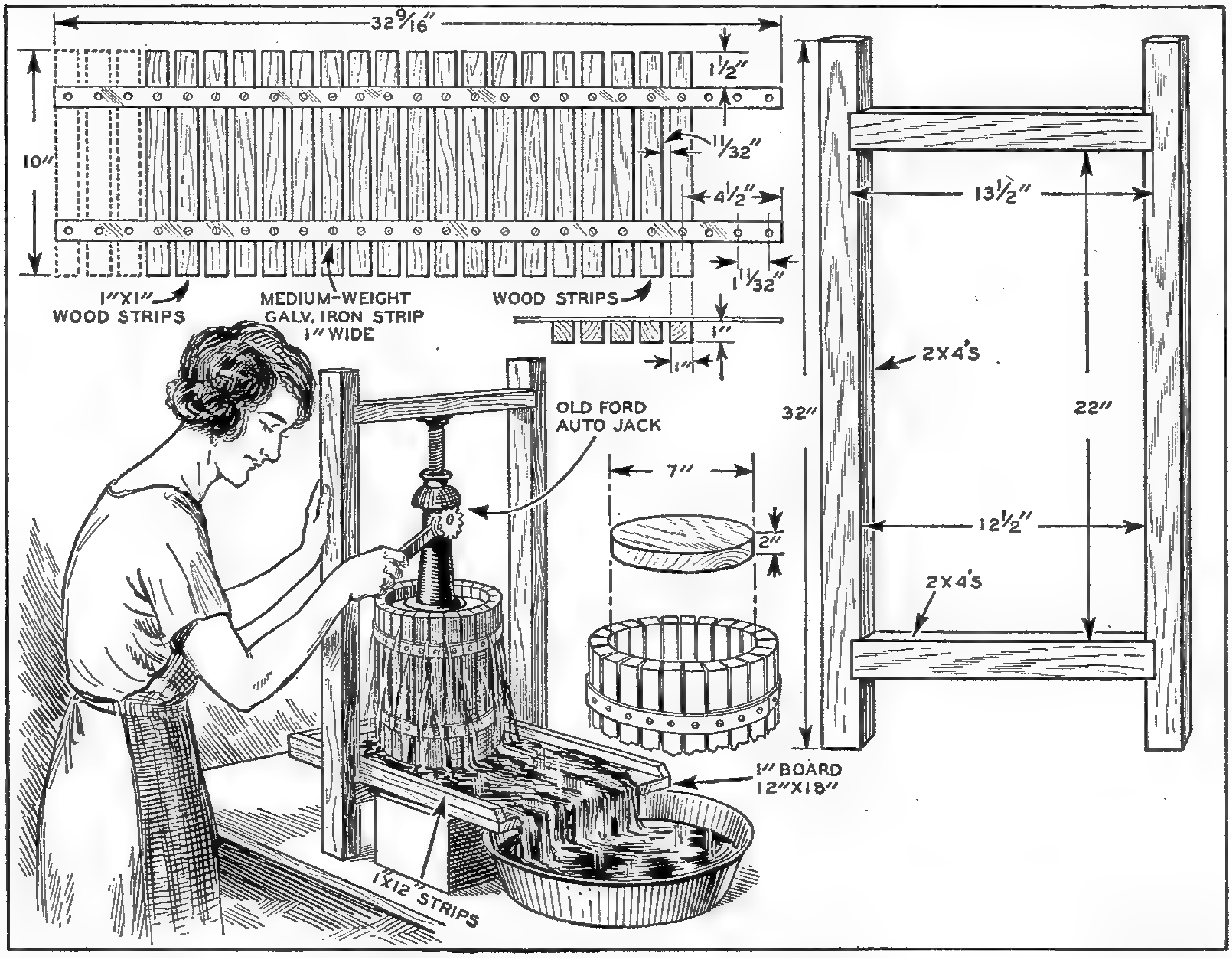

—MAST HEAD DETAIL—
MAST BAND
BLOCK
TILLER
CHEEK PIECES
¾" MHGY
SKEG
DETAILS OF RUDDER
USE THE SAME FITTINGS AS ON STEERING TILLER
¼" ROPE EDGE
14'-3"
2" ROACH
16" SLATS SEWED IN
13'-0"
SAIL PLAN
MAST 14'-0" DECK TO TOP YELLOW PINE
2" DIAM
MAST BAND WITH EYE RING
9'-0"
1½" D.
BOOM 9'-4" YELLOW PINE
2" D.
¼" STEEL STRAPS
MAIN SAIL HALYARD
2½" DIAM.
SHEET
¼" BOLTS
YOKE
DETAIL OF BOOM YOKE
PAD FOR ROW LOCK SOCKET
CHINE ¾" x 1½" W. OAK
⅝" SPRUCE SEAT
⅞" KNEE OAK
THE—COMPLETE ASSEMBLY OF—ALL SORTS—
½" x 4" BOTTOM PLANKING
½" CEDAR SIDE PLANKING
MAST
¾" SPRUCE SEAT
¾" KNEE
SIDE FRAMES ½" x 2" OAK
W. OAK BREAST HOOK
STEM
CENTER BOARD TRUNK
¾" SEAT SPRUCE
ALL SORTS
CLEATS
11"
⅝" OAK
30"
NAILS TO SECURE LEAD
LEAD
CENTER BOARD DETAIL
JN POLIVKA

Fig. 6. The layout and the sail plan for "All Sorts." All details of the sailing rig are shown, and Johnny Polivka, staff artist, has shown the varied uses to which this boat is well adapted.

Home-Made Press Extracts Fruit Juice



Construction details for parts of the fruit juice press are given in the drawings above. Keep in mind that the frame should be exceedingly sturdy and securely nailed in order to withstand the excessive pressure from the auto jack.

ALL that is needed for the construction of this fruit juice press is two strips of medium-weight galvanized iron, an old Ford automobile jack, a supply of lumber and some nails.

Shape twenty-one strips of wood to dimensions shown in diagram above. Lay them side by side on a flat surface. 4½" from one end of each of the iron strips, on the center line of the strip, make a small hole with a sharp center punch. With a ¾" nail, fasten the iron strips to the first wood strip at 1½" from each end of the latter. Continue this process until all but three of the wood strips are fastened to the iron strips, leaving a space of 1 11/32" between center punches.

Assembling the Slotted Cylinder

Punch the remaining holes (at the right end) and fasten the last three wood strips at the points where these holes have been made by lapping the iron strips and nailing through both thicknesses of the metal, which then forms a slotted cylinder.

Make a frame or yoke using 2"x4" board as shown on right of photo. Be sure to nail it securely. Next take a 1" board 12"x18" and nail a thin strip along the two sides and one end to prevent the juice from running over the sides. Then saw a circle exactly 7" in diameter from a 2" board. It should fit snugly into the slotted cylinder but loose enough to allow it to slide up and down.

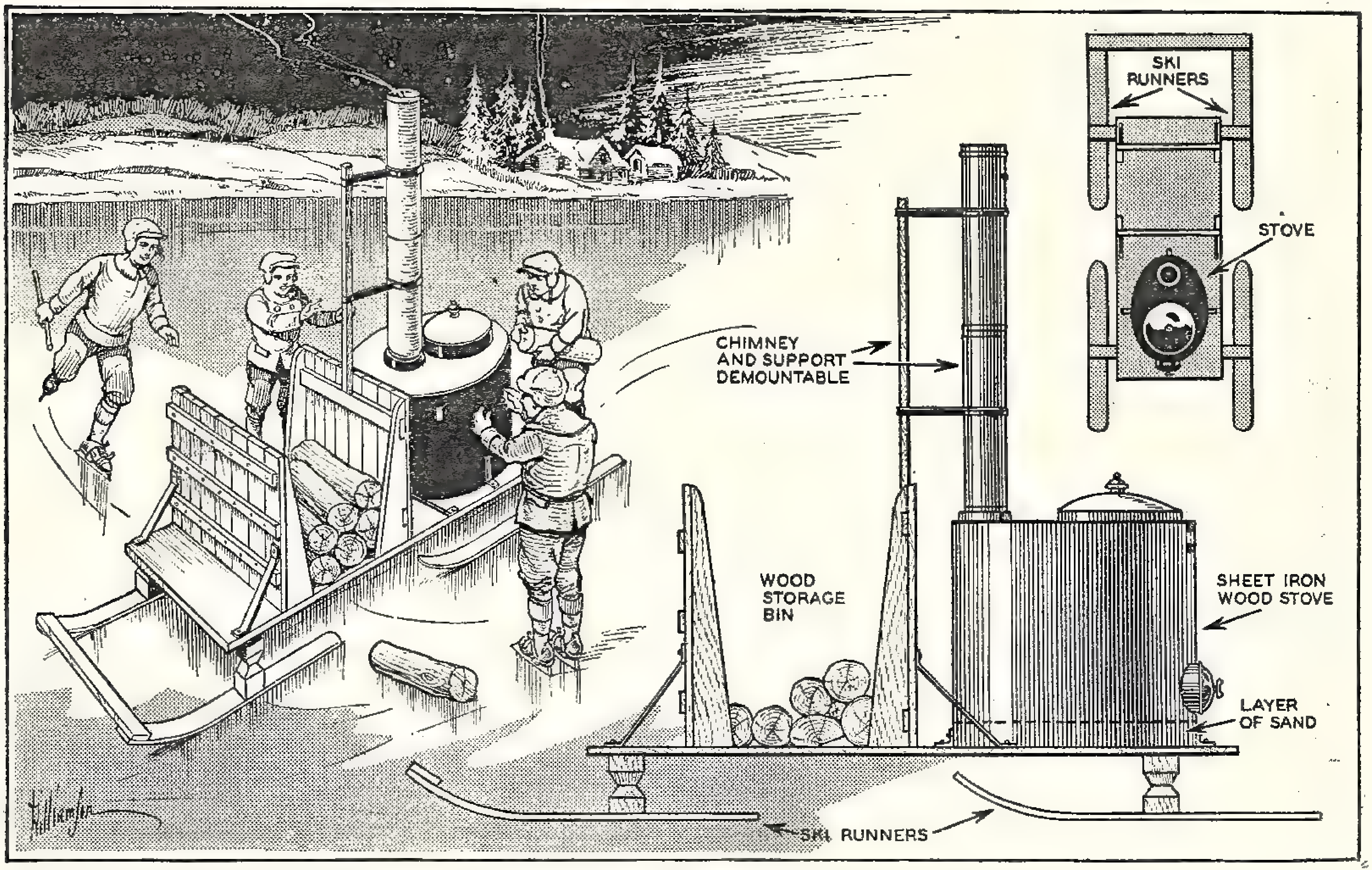
Nail the pan affair securely to the frame allowing the end with the strip to extend about 6" beyond. Set the slotted cylinder in place with the center directly below the center of the frame.

How to Operate the Fruit Press

The device is now ready to operate. Put the fruit to be pressed in the cylinder, fit the circular board into the top and set the auto jack (screwed down as far as possible) on top of the circular board. Now by operating the jack as in raising a car, the circular board is forced down into the cylinder and the juice runs out through the slots, onto the bottom board from which it flows into the pan. A bag made of burlap to fit the interior of the cylinder may be used to hold the fruit and will make the extracted juice much clearer.

After the parts of the press have been cut to size and before putting them together, it is well to give all members that come in contact with the juice a coat of shellac or varnish to prevent them from absorbing the juice and for greater ease in cleaning.—M. M. Glauber.

SLED STOVE for SKATING PARTIES



When bitter cold weather comes around, this sled stove will keep you plenty warm and prevent frostbite. An ordinary air tight stove is mounted on the sled just behind the wood bin. Skis permit transportation behind an auto to any lake near by.

YOU skating fans who suffer from cold hands and feet in bitter cold weather, when your sport is best, will perceive instantly the service this sled-stove can do you. It can be transported anywhere, and will be well worth whatever effort you may put into it.

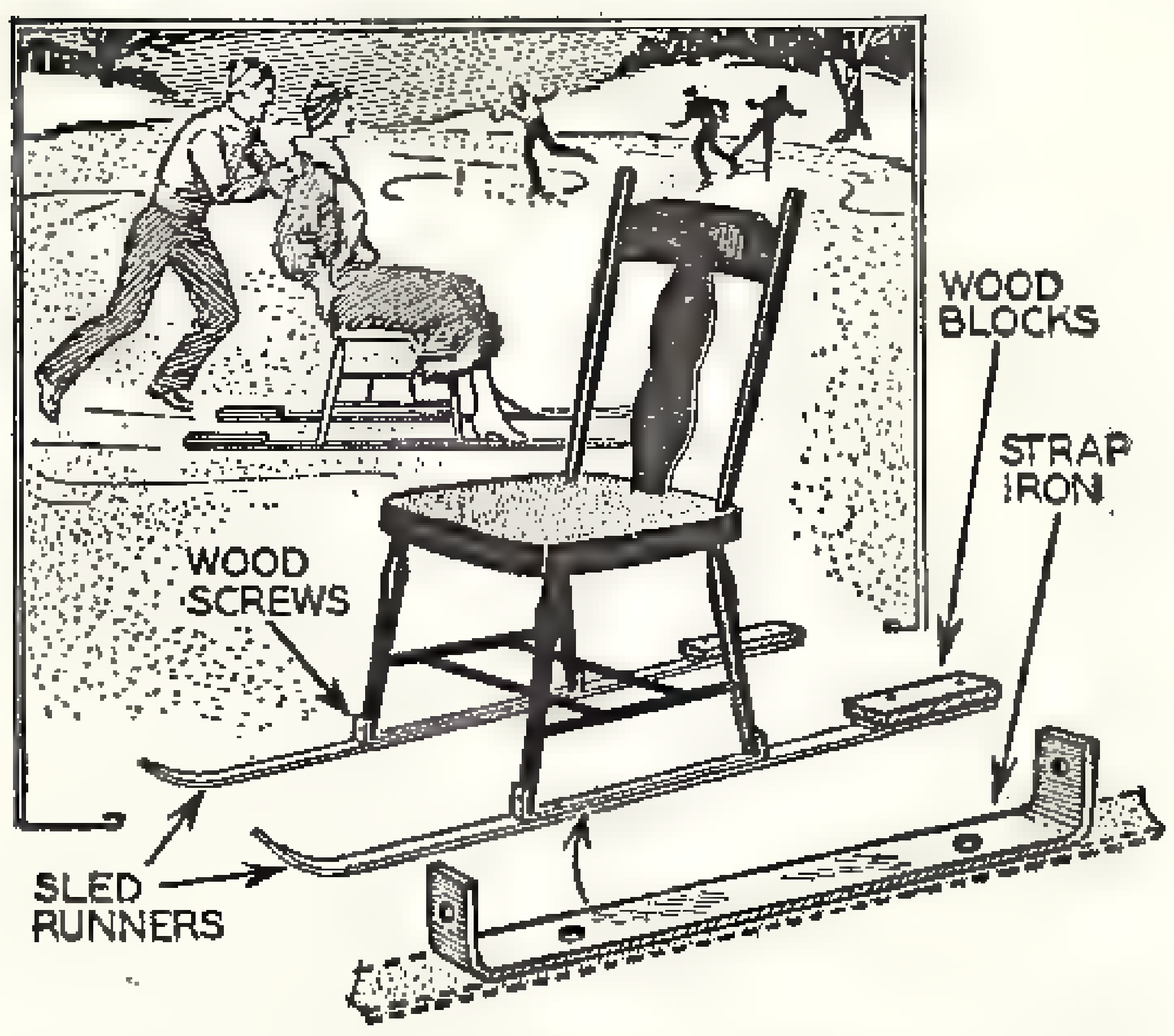
In the sled shown, an ordinary air-tight stove was used, the legs of which were removed. On the inside a three-inch layer of sand is put down for insulation purposes. The stove was then mounted on a bob-sled which measured seven feet long and fifty-eight inches wide. This arrangement permits the stove to be hooked on the back of a car and hauled to any desired point.

Notice in the drawings that a rack is built in the front of the stove for the fuel supply, sheet iron being used to insulate the framework. The stove pipe—two lengths—was riveted together and fastened to a wooden post, the whole attachment being readily removable to aid in moving.

Ski runners made from oak barrel staves made the sled serviceable in loose and unpacked snow. When you have set the sled out at its location proceed then to cut a good supply of logs and you will suffer from frost-bitten hands and toes no longer.

In building an open fire, it will be much more enjoyable if you choose an overhanging ledge as a site, giving a sort of fireplace effect, and protecting against uncomfortable winds if you choose the leeward side. This portable stove, of course, makes you independent of weather conditions.

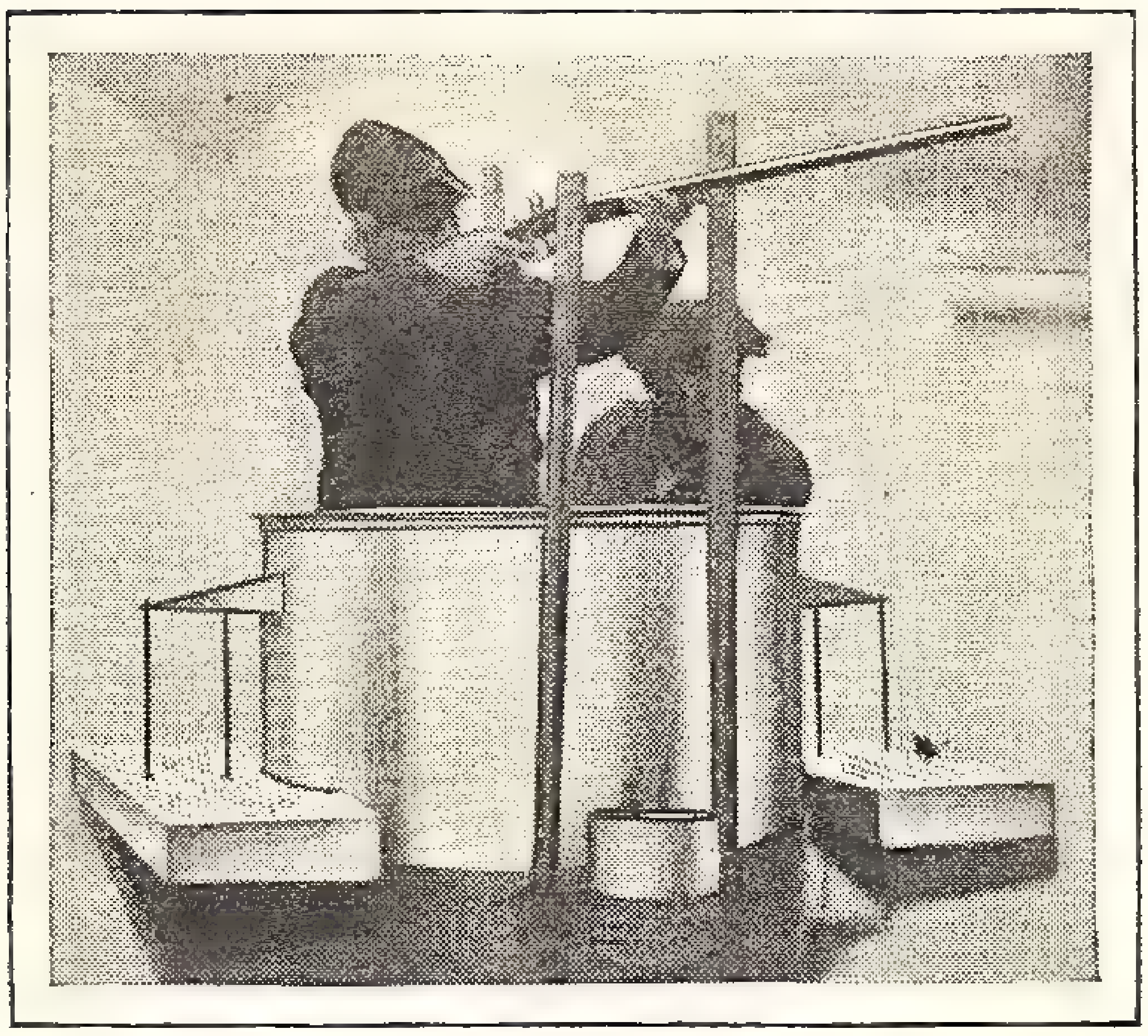
Kitchen Chair Mounted on Runners Makes Sled for Ice Racing Thrills



The chair is secured to the sled runners by means of the strips of strap iron.

YOU haven't exhausted all the possibilities of sled construction till you've made this little gadget. It's nothing more than a chair mounted on a pair of runners, but the fun it provides is endless. First lay hands on a pair of old sled runners and secure to them, in the position shown, the strap iron braces. To these are bolted the chair, which may be of the kitchen variety. On the stern of the runners nail a pair of blocks. This permits the ice gondolier to do a little riding himself when he gets tired of pushing you around. It will be a good idea to brace the chair firmly with wires, since it has to take an excessive amount of punishment. It is best to use as heavy an old chair as possible, and the bracing wires can be tightened by a tourniquet arrangement for twisting them together. The bracing principle is the same as that of airplane wings.—Chet Sullivan.

Non-sinkable Duck Blind Adjustable to Various Elevations



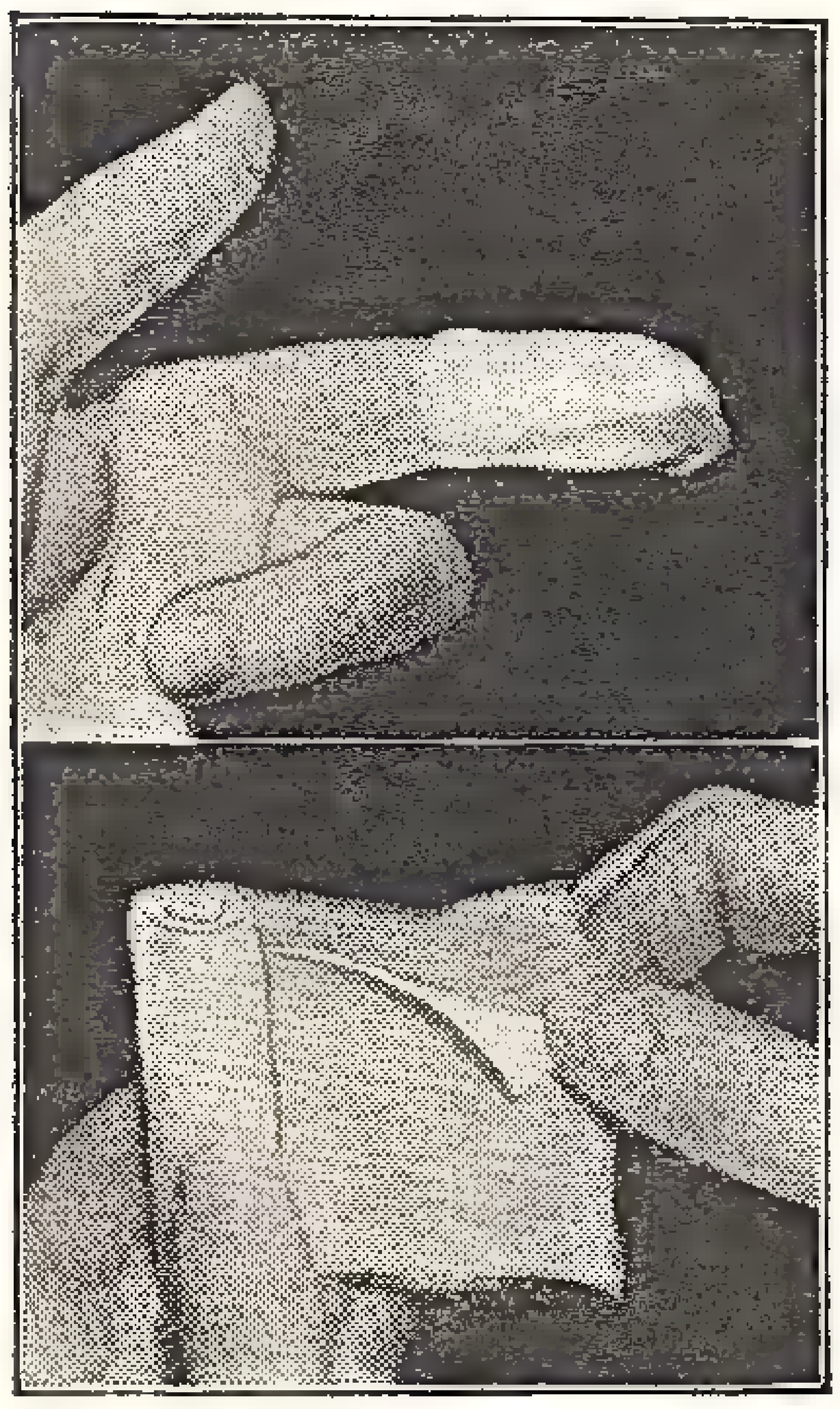
The non-sinkable duck blind, shown above, is adjustable to various elevations above the surface of the water. When in actual use, it is camouflaged with leaves and brush in the conventional manner to fool the cautious ducks.

THE non-sinkable duck blind seen in photo at left is the latest development in the sport of waterfowl shooting. The blind is adjustable for various elevations above the surface of the water. Circular in shape, it has two pontoon arrangements for stability.

The device will comfortably hold two men without crowding. In actual use, the blind is camouflaged with leaves and brush in the conventional manner to fool the cautious ducks. Tests have proven satisfactory in every instance and when demonstrated before several noted sportsmen, they praised it highly.

Self-applying Bandage for Cuts

IT HAS always been quite a task to bandage your own finger when cut and usually requires the help of another person. A self-applying bandage now on the market has been designed to overcome this inconvenience. To apply the new bandage all you have to do is cut the gauze to fit the finger and pinch it together, as demonstrated in the two photos at left. Adhesive qualities are incorporated within the gauze holding the bandage firmly in place as long as desired. This new medical aid is especially valuable for campers, households and the autoist.



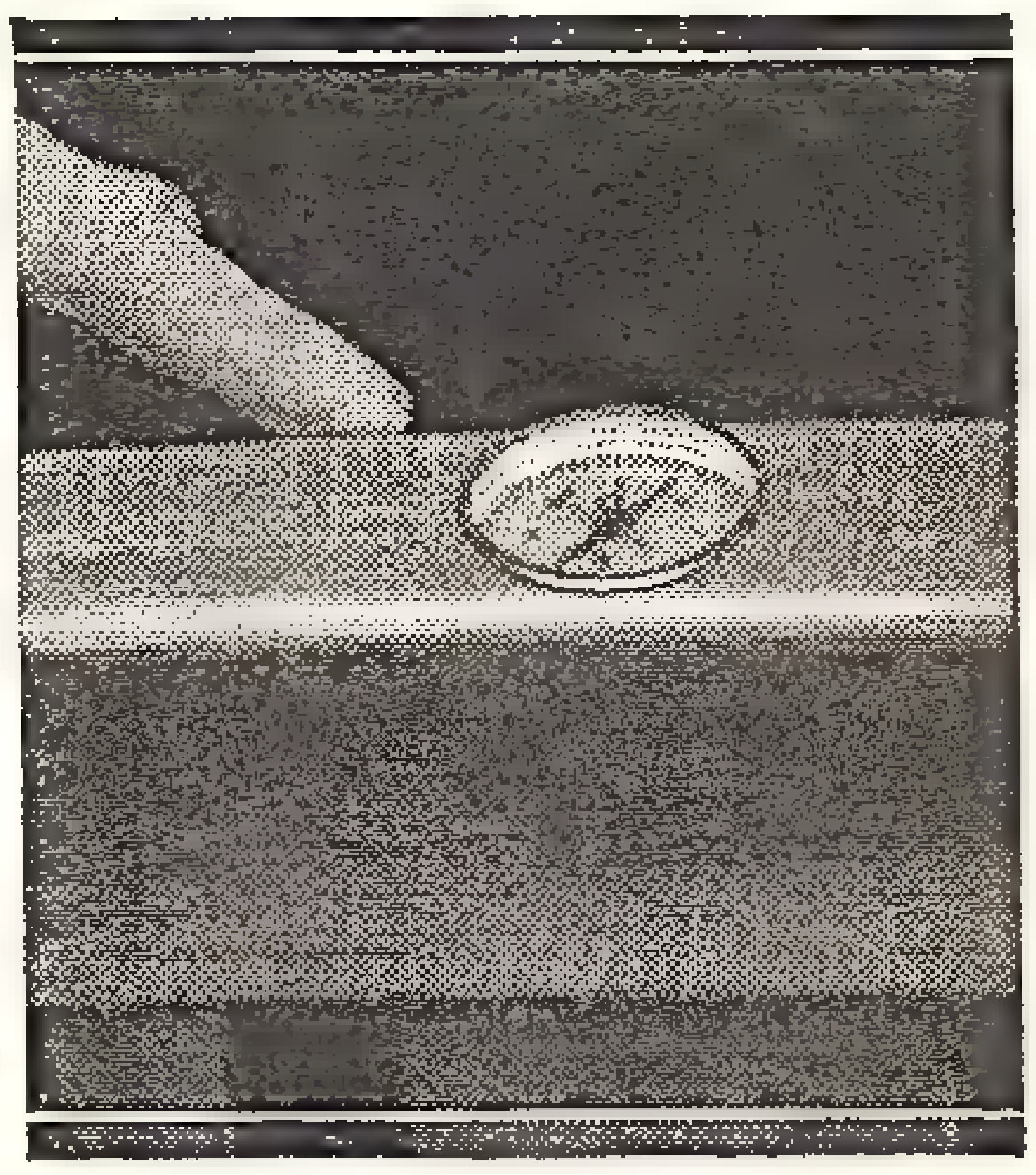
Self-applying bandage contains adhesive qualities permitting one person to patch a cut finger.

Precautions Against Child T. B.

THREE chief precautions against tuberculosis in children are suggested in a recent report to the Medical Research Council of Great Britain by a doctor of Glasgow, Scotland. One is to keep children away from infected adults. The second is to use only boiled cows' milk or milk known to be from cows which are not tubercular. The third is to keep as clean as possible the floor and other parts of rooms where children live.

Bed Compass Locates North Pole

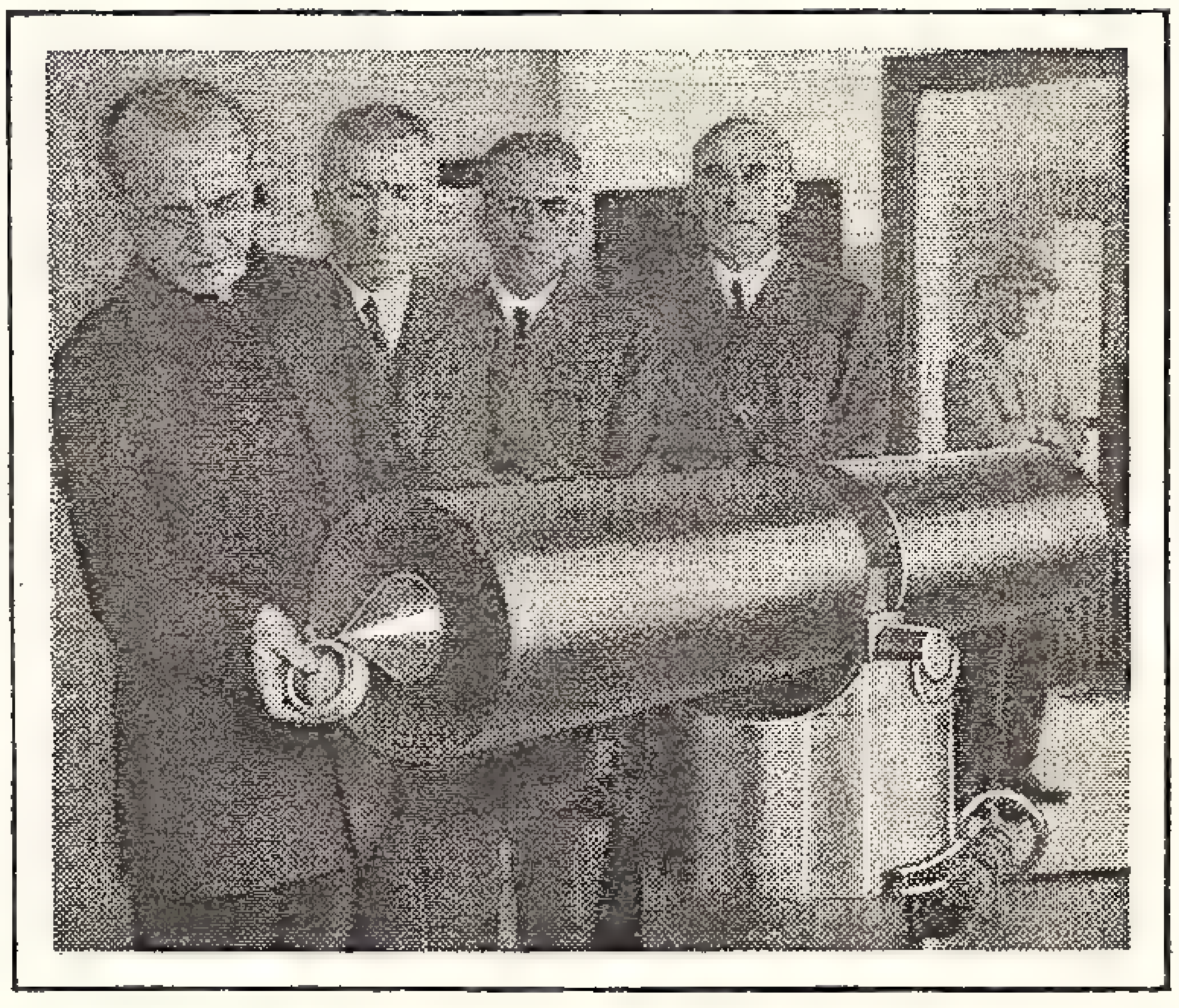
SCIENTISTS have recently advanced the theory that sleeping is better accomplished with the head pointing north. With this view in mind, an enterprising furniture maker devised the compass bed shown in accompanying photo. The compass is placed in rail.



Compass is set in bed rail, as shown, to enable sleepers to recline with head pointing north.

Magnet Removes Metal From Body

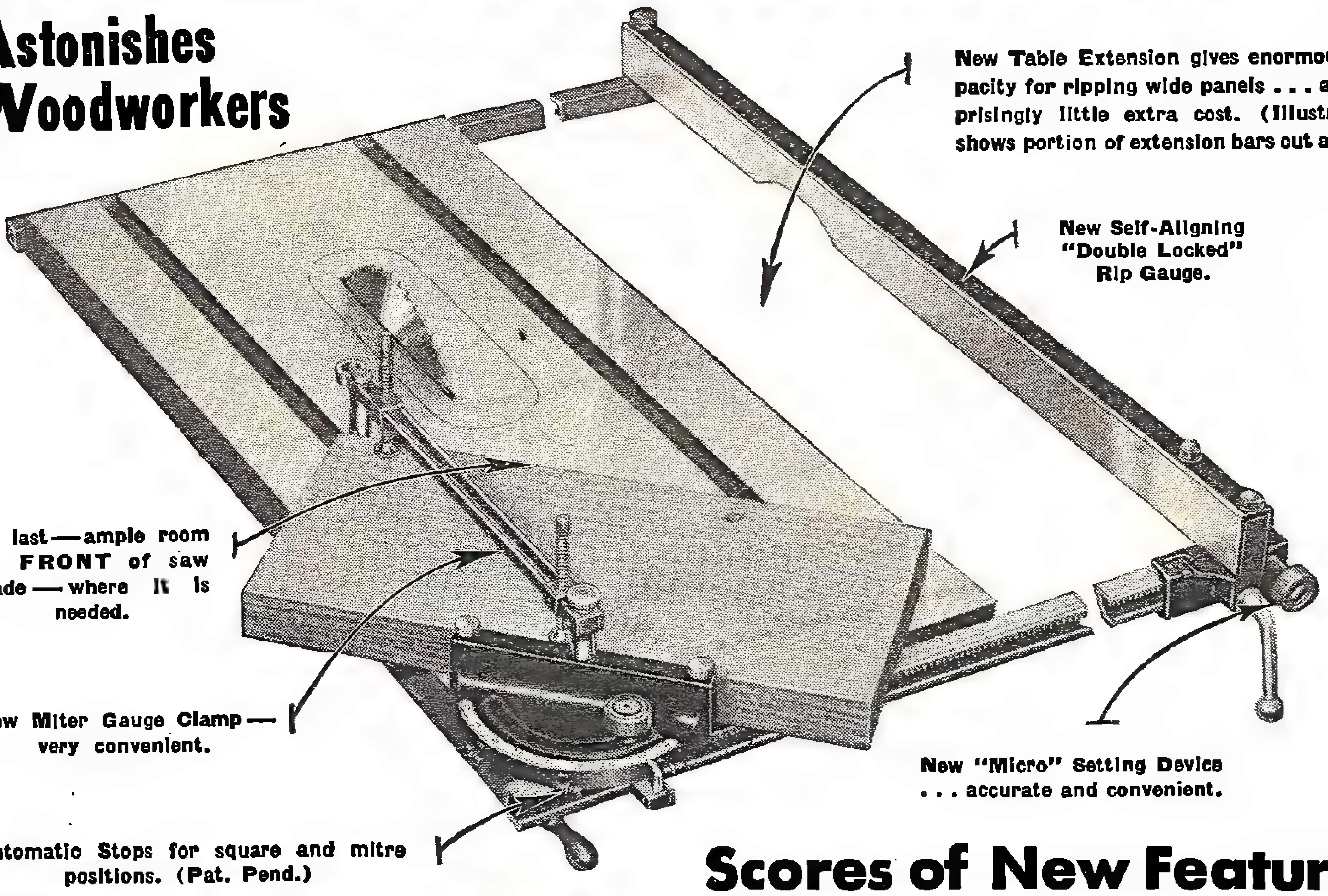
AN ELECTRO-MAGNET claimed to be the strongest of its kind in the United States has been installed in the University Medical School of St. Louis, Missouri. The magnet, demonstrated in photo below, weighs one and one-half tons. It is used to remove bits of metal from the bodies of patients, particularly from the eyes.

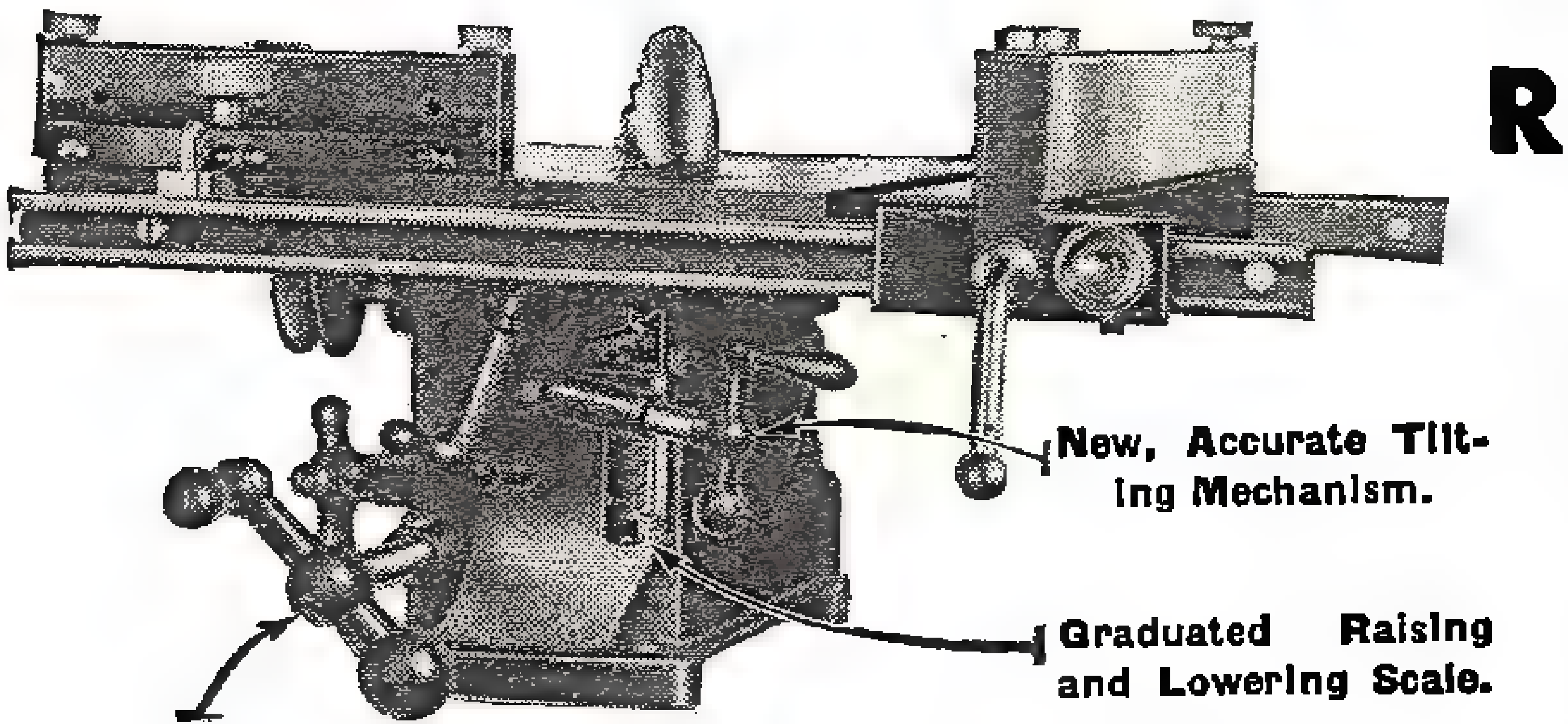


This huge electro-magnet weighs one and one-half tons and is the largest of its type in the United States. It is used to remove bits of metal from bodies of patients.

New Circular Saw

Astonishes Woodworkers


New Table Extension gives enormous capacity for ripping wide panels . . . at surprisingly little extra cost. (Illustration shows portion of extension bars cut away.)
New Self-Aligning "Double Locked" Rip Gauge.
At last—ample room **IN FRONT** of saw blade—where it is needed.
New Miter Gauge Clamp—very convenient.
New "Micro" Setting Device . . . accurate and convenient.
Automatic Stops for square and mitre positions. (Pat. Pend.)


New, Accurate Tilting Mechanism.
Graduated Raising and Lowering Scale.
Improved Raising and Lowering Mechanism—one turn equals 1/16 inch.

Scores of New Features

Radically New Design

DESIGNED completely new from the ground up, this latest 1933 "Delta" Saw has every feature that woodworkers have wanted for years—and yet it is so moderately priced as to be within the reach of all. It offers extra space in front of the saw blade, where it is most needed, plus all the advantages of a table 4 feet square, at a fraction of the ordinary cost of a large table. It incorporates scores of important improvements and exclusive features. With a choice of designs available, "Delta" engineers, after thorough tests on all types of work, and under all conditions, selected the TILTING TABLE design (no tilting arbor) as being the most efficient and practical. For full details see the new 1933 "Delta" Catalog.

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Because "Delta" Woodworking Tools are efficient and practical under actual working conditions, they are always available for a 10-Day Trial without the slightest risk. Satisfaction is guaranteed. For full details of this liberal offer and also of "Delta" Easy Payment Plans, fill in and mail the convenient coupon below, TODAY!

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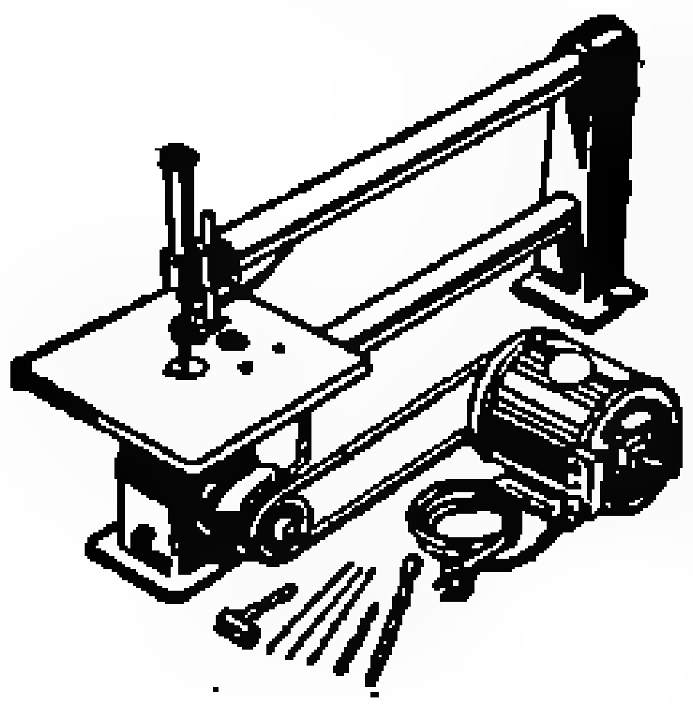

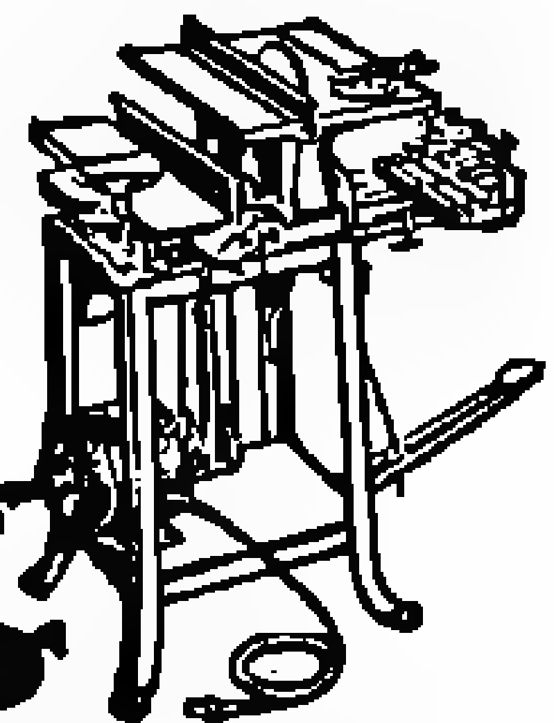

The "Delta" line includes Jointers, Circular Saws, Band Saws, Woodturning Lathes, Drill Presses, Scroll Saws, Boring, Routing, Sanding, and Mortising Attachments, and a complete line of accessories.

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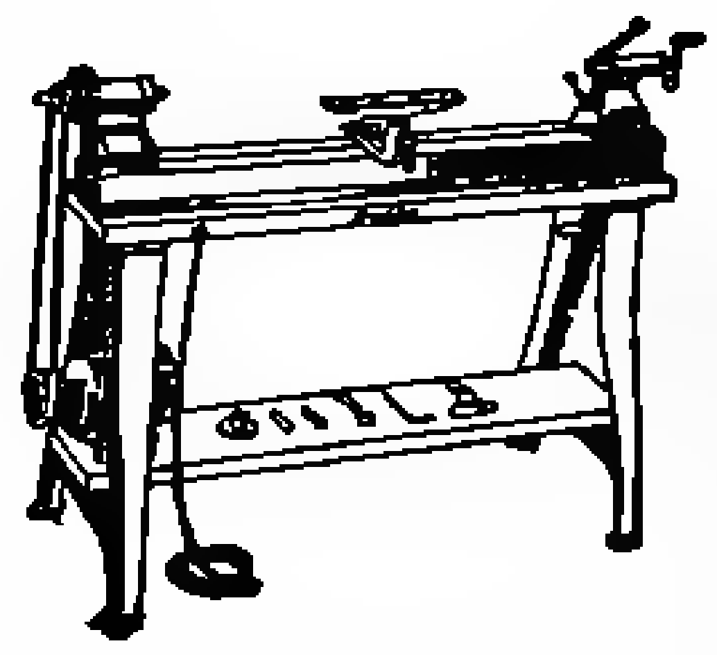

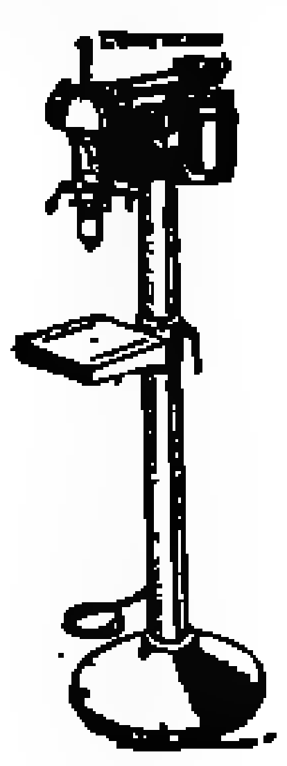

It is packed full of interesting illustrations and descriptions. It describes the latest developments in motor-driven equipment at the astonishingly low 1933 price levels. Mail the coupon TODAY for your FREE copy.

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How Much to Spend for New Home

(Continued from page 114)

Plan No. 3-G-57 is another of those popular garage houses which are proving life savers for many whose income has been sliced to almost the breaking point.

The house is Colonial style. The lower floor accommodates either two cars, or one car with half the floor space as a sleeping room. Above is a compact kitchenette apartment with combination living and dining room. There is one bedroom, a complete bathroom, kitchenette and a closet sufficiently large to accommodate a closet bed which provides a second bedroom service so that four people can be comfortably accommodated in this extremely small floor area. A feature of the house is the balcony stretching across the front.

The house is planned to be built at the rear of a lot and for this reason should appeal to many lot owners who are not yet ready to build a large house.

The house may be built of frame, or hollow tile or even of brick. In frame, with stucco exterior, it should not cost over $2500, perhaps less, considering present prices. You may omit the fireplace if you wish, but this feature is desirable and is recommended for comfort.

Both houses this month fit present day incomes and at the same time provide a large degree of comfort at small cost. Hope you like them. Now is the time to build, or at least contract for your house, when prices are lower than they will be for a long time to come.

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29x5.00-19"	2.95	1.20
30x5.00-20"	2.95	1.20
28x5.25-18"	2.95	1.25
29x5.25-19"	2.95	1.25
30x5.25-20"	2.95	1.25
31x5.25-21"	3.10	1.25
28x5.50-18"	3.20	1.30
29x5.50-19"	3.20	1.30
30x6.00-18"	3.20	1.30
31x6.00-19"	3.20	1.30
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33x6.00-21"	3.20	1.35
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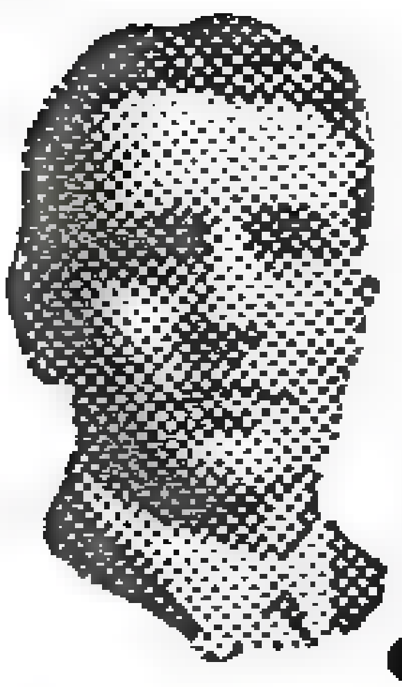

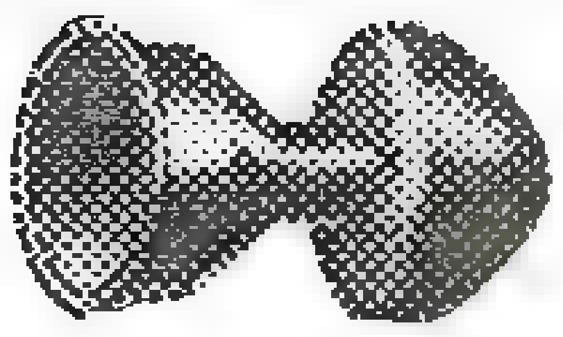

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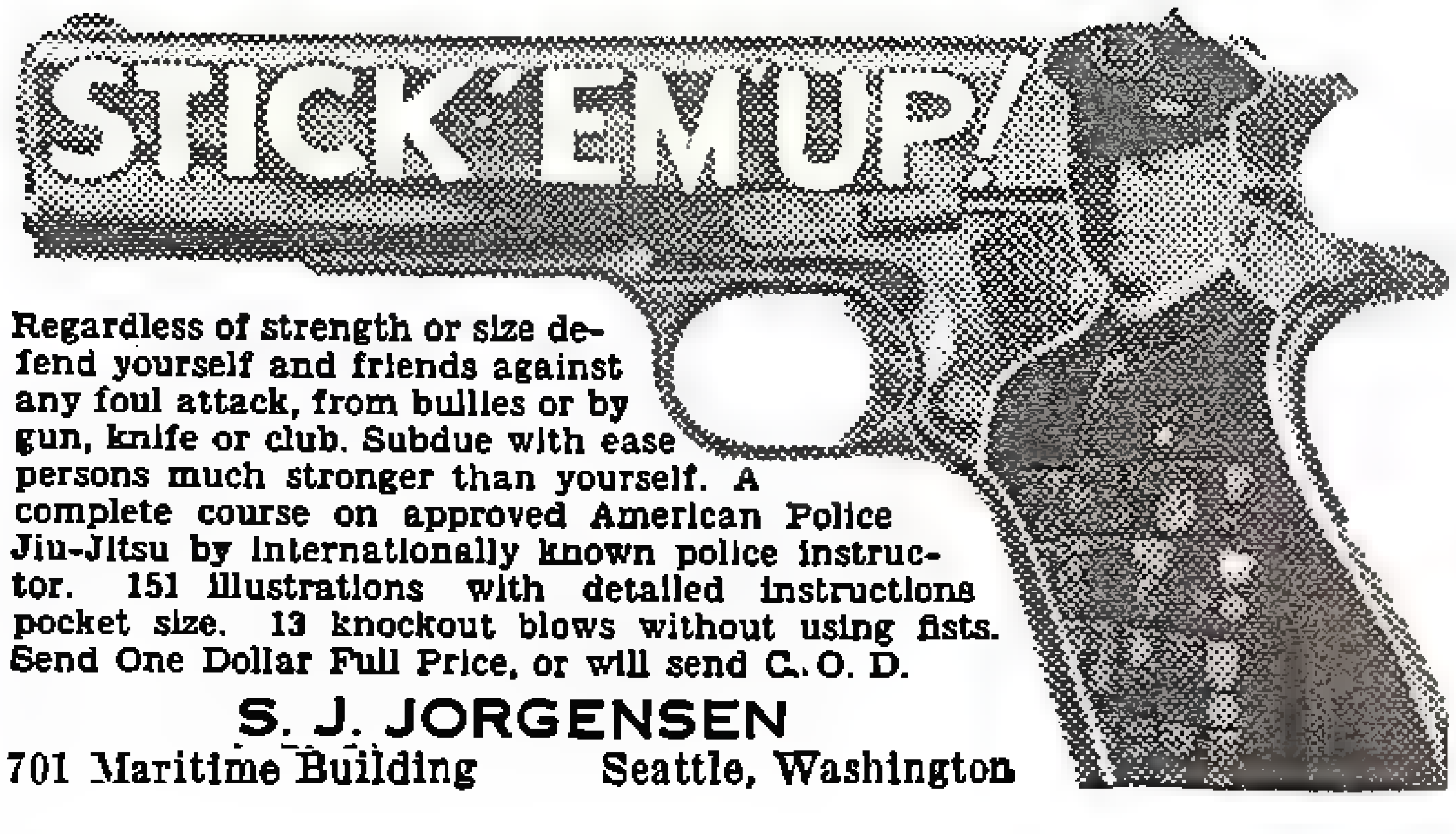

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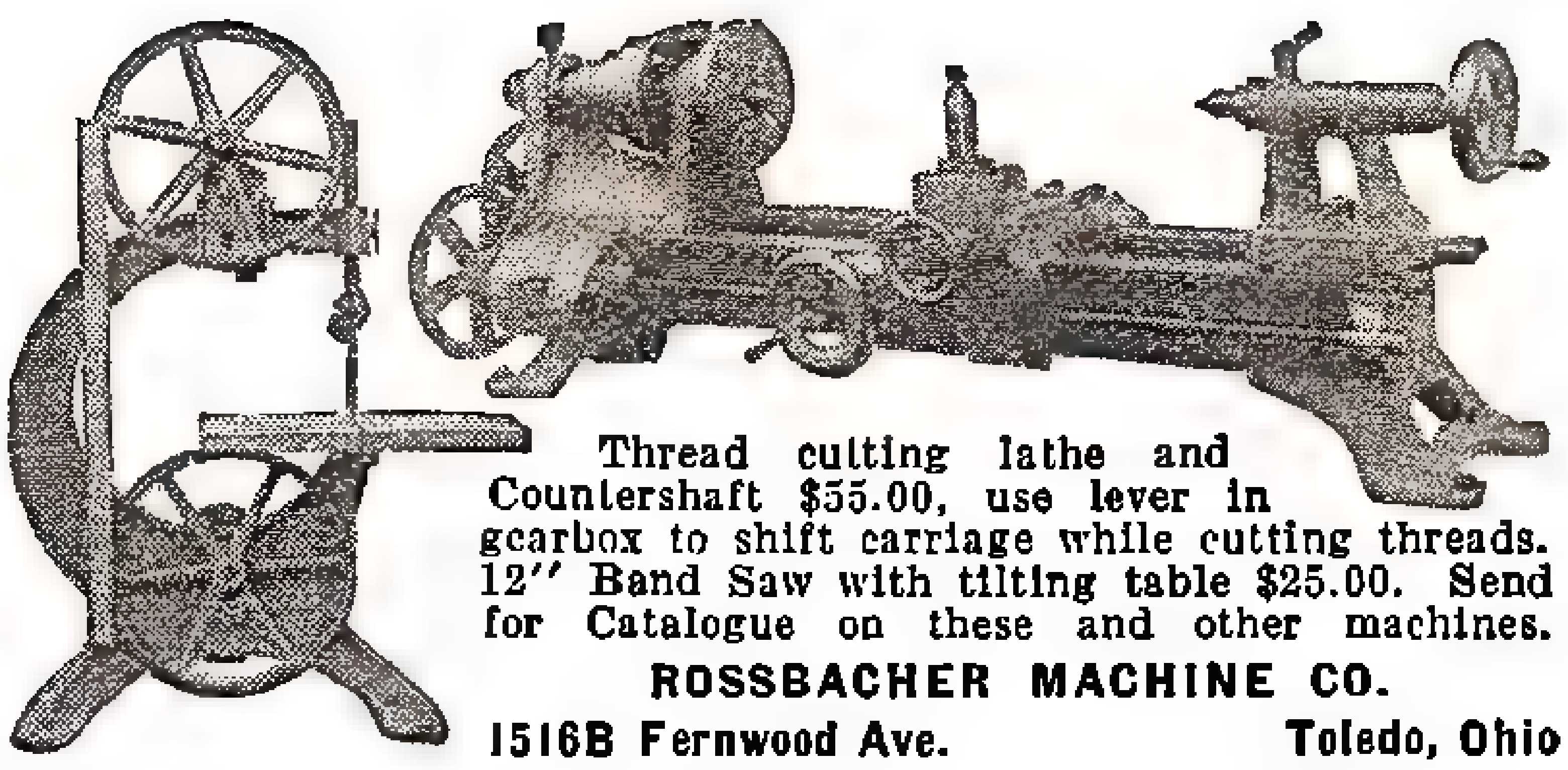

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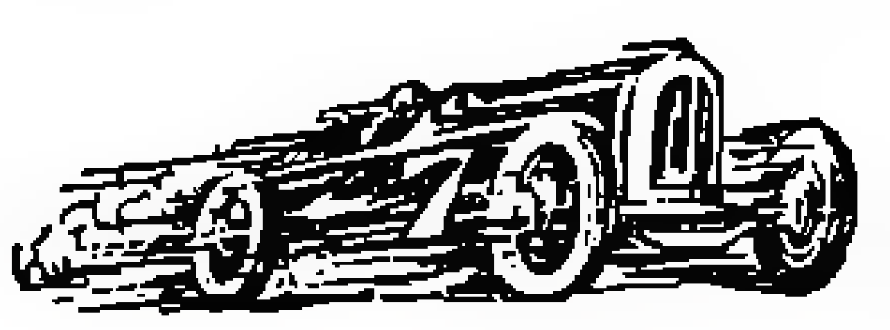

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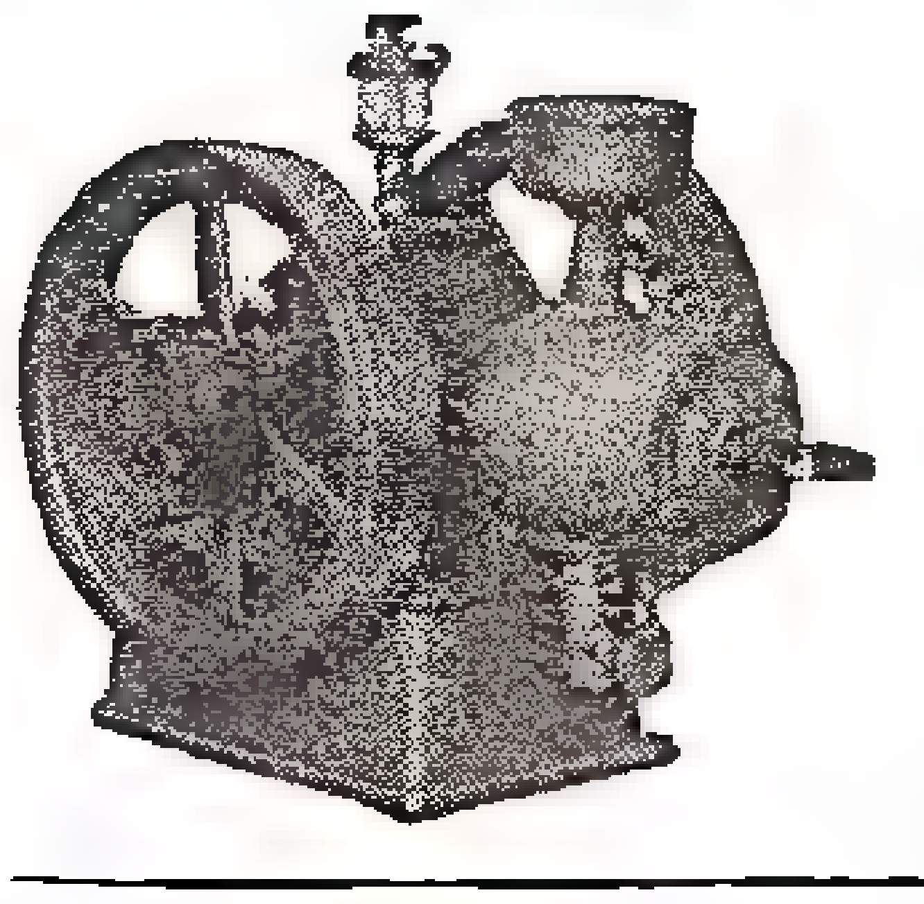

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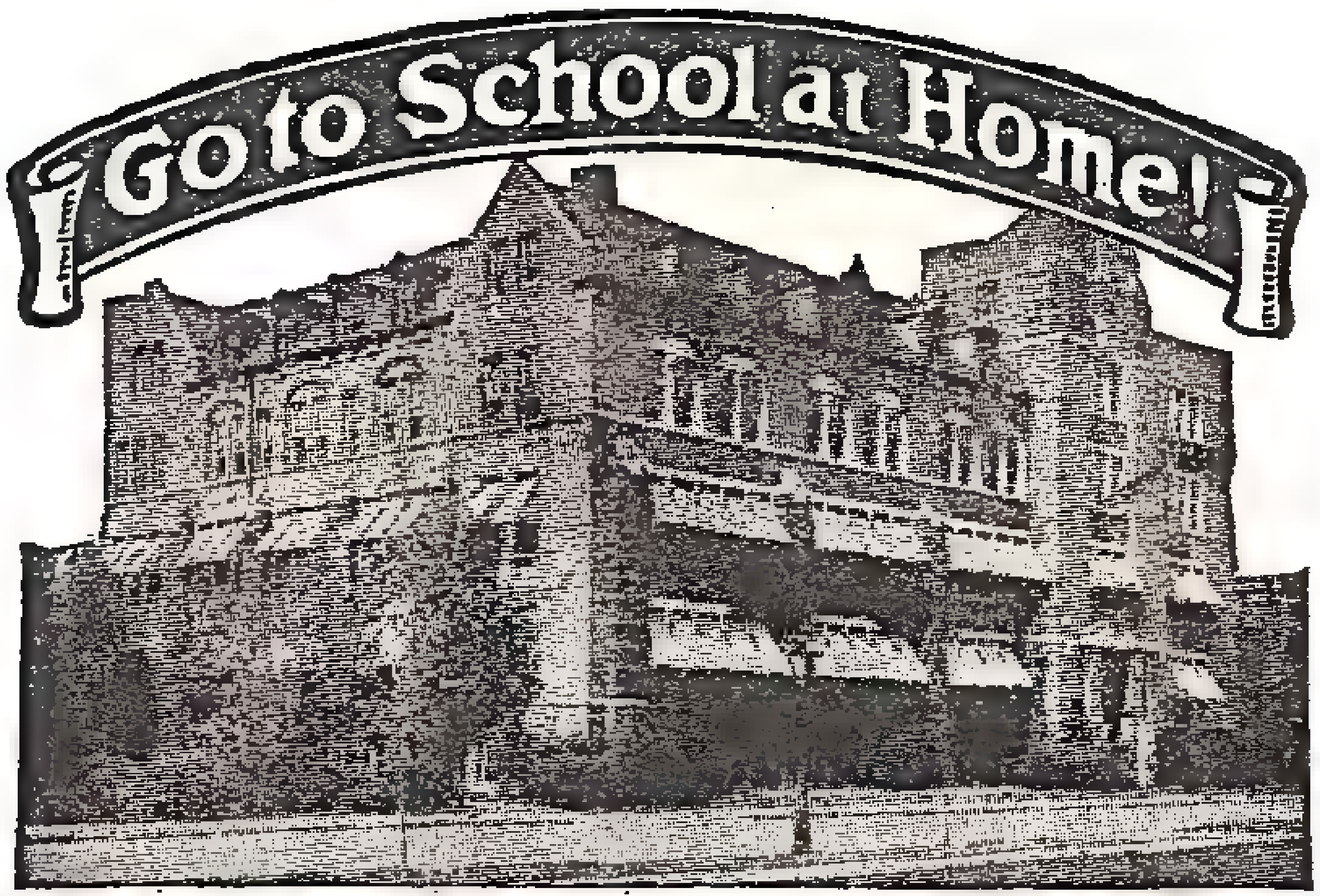

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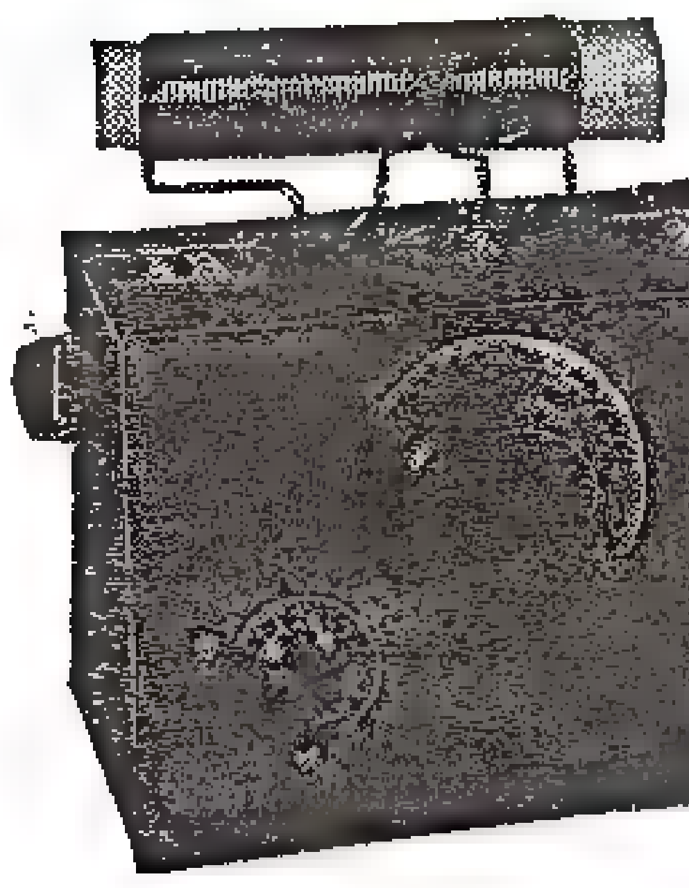

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The Long Harlequin Motor

(Continued from page 113)

using the two 9/16" spacers shown. Don't be afraid to tackle this pump, it is quite simple.

The oil line layout is simple. The right side of the pumps is the input side. The small hole on the center line is plugged on the right side. The one on the left is used for the main pressure line and also to the pressure gauge on the dash. Look carefully at the drawings and it will all be clear. The stopcock to the rear of the rear pump regulates the pressure, which may be from 25 to 200 lbs. per sq. in. We use 80 lbs. and find it about right. There are two lines to the oil tank. The overflow from the rear pump is also joined by the scavenge side of the front pump. The suction line comes to the right side of the rear pump. The short line from the sump goes to the right side of front pump. Use 5/16" line all around with the usual fittings.

The lifter arm arrangement is clearly shown. Take a set of regular Harley arms apart. Get a new exhaust and a new intake lifter bushing. The arms with the fork end are used on the right side of the motor. Slip the bushings in place and put the arms on the stud and cotter neatly. The left side set must have the spacers cut from tubing exactly as shown. Assemble them on the stud and cotter. Don't let them have too much play.

This brings us to the final item, the manifolds. No exact measurements are given. The drawings are quite plain. Weld up the center part and bolt it solidly to the bottom of the gear case. Braze in the 2-inch piece in the regular Harley intake manifold nut, after sawing off the outer threaded part. Then weld on a piece that will line up with the center part, so that the pieces of hose will cover the gap neatly. This gap takes care of expansion and allows the motor to be placed on its bed by slipping the hose to one side and dropping it in place. See that about 2 inches is left between the manifold and the bed plate on the case as the motor bearer goes between them. Use wire or hose clamps to keep the hose air tight.

The exhaust arrangement you may do as you like with to suit your ship and cowling. We use the simple little elbow shown. We take out the regular exhaust manifold nut and slip this elbow in the manifold. It is held by a screw going through a 3/16" hole drilled near the end of the manifold cast on the cylinder and one in the elbow to match. We braze a nut inside the elbow to take the screw.

This completes the job. It has taken a lot of words to describe it, but the actual work is really quite simple. Most of the things are perfectly obvious as you go along, and the majority of the parts have already been made to fit. Anyone who likes tools and machinery can't help enjoy making the engine, and there is very little chance of failure in any part. If the full-size blueprints are at hand you just can't go wrong.

The timing is regular Harley. If you cut the key seat on the shaft in line with the throws most of the marks on the gears will check. However, you had better get a motorcycle rider to help you time it. Only two of the binding posts on the magneto are used, of course. The other two may be grounded. Time the magneto by setting a

The Long Harlequin Motor

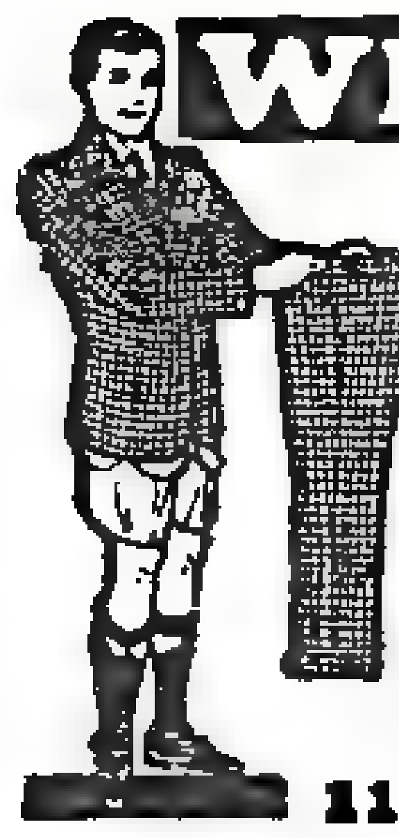
cylinder in firing position and setting the breaker so it is just cracked. Slip the magneto gear through the hole and in mesh with the cam gear and bolt the magneto down. The other cylinder will use a diagonally opposite binding post.

The carburetor flange shown is for regular 1¼ inch. You may use any make you like, but we have found that the Winfield model M or S is by far the best for this motor.

With the engine on a test stand or in the ship it should be run for an hour or so at around 1,000 rpm to loosen up. Watch the oil pressure and stop frequently to see that the cylinders are getting the right amount of oil.

We recommend a propeller of 5 feet or 5 feet 2 inch diameter by 30-inch pitch. This depends on your ship, however. When your motor shows about 2750 with this prop you are ready to fly. We think you will agree that this engine has the most ear-splitting, convincing roar to it you ever heard. It sounds like a whole flock of army pursuits coming. It is a real joy just to see and hear it work.

If you need help don't hesitate to write us about anything, but whatever you do, don't forget that stamp. This 3-cent rate on several hundred letters counts up. The address is Les Long, Cornelius, Oregon.



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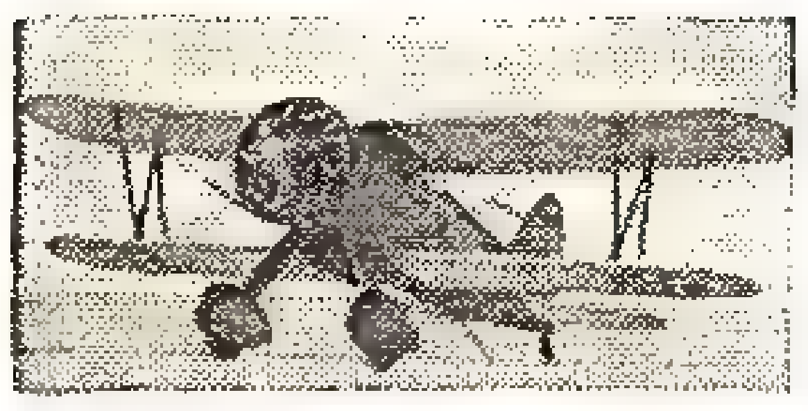

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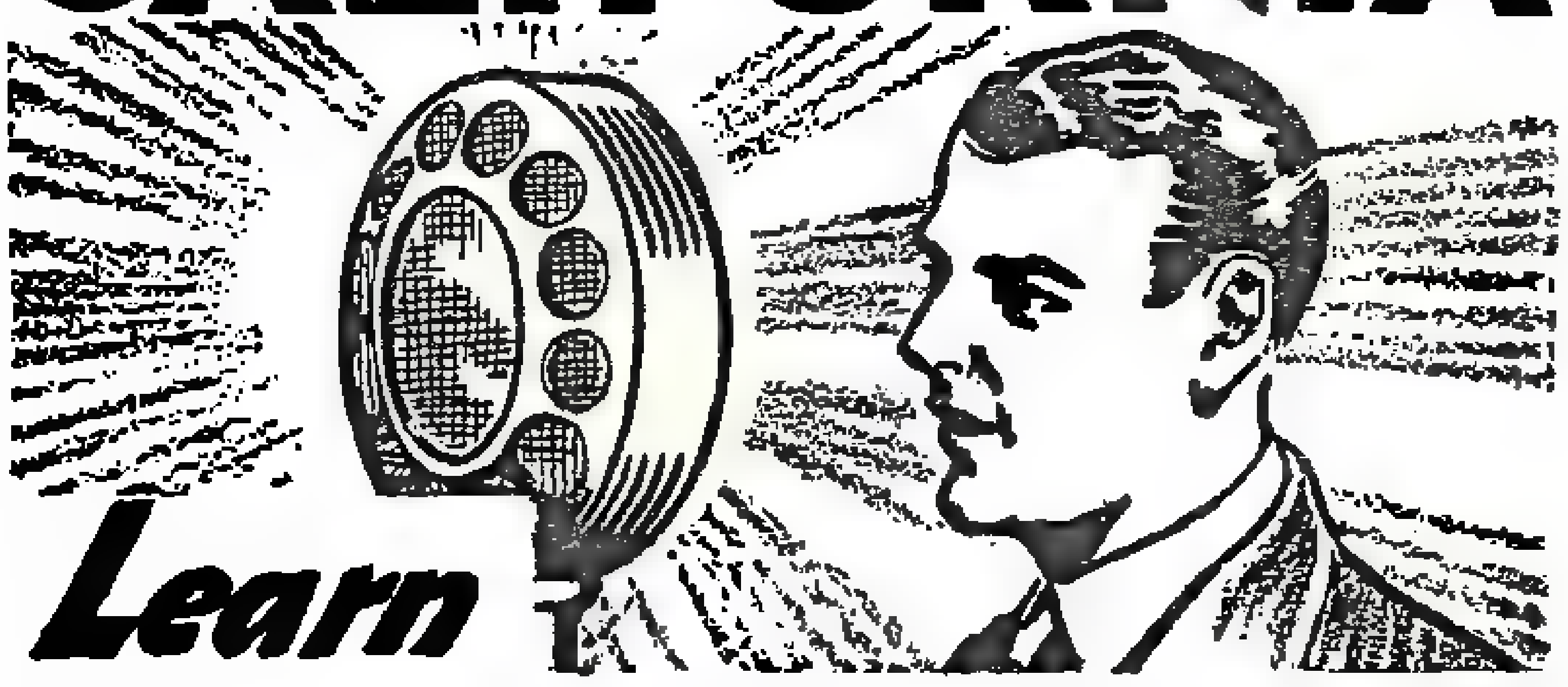

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Rubber Bands Drive Midget Auto

(Continued from page 95)

will fit perfectly in the V grooves. Positive traction can then be had with very little tension on the belt, and if the grooves are sand-papered very smooth, little friction is offered when the belts "idle."

Fig. 9 shows the miscellaneous parts that enter into the complete car. The "gear shift" lever will appeal to boys who want all the do-dads, but if one forward speed only is used, the lever can be eliminated, as the free wheeling arrangement does away with the need of an idler pulley.

Fig. 8 offers a tentative design for the body of the midget car. This design is really a suggestion only, subject to many variations at the whim of the builder.

The Rubber Bands

Now for the all-essential source of power—the rubber bands. These can be had practically without cost. Visit some tire or vulcanizing shop and buy a quantity of discarded inner tubes. The prevalent market price is ½c a pound.

From out of this mass of rubber you are sure to find hopelessly blown out tubes with the rubber still live and active. With sharp, wire-edge scissors, start at the valve stem and split the tube completely around its inner circumference—the part next to the tire flap. The tube now appears like a wide rubber belt.

Now start at some point on the edge and cut a 3/16" strip around and around the belt. Eventually the wide belt is converted into a long, narrow strip of rubber.

Enough strips must be cut to provide 24 strands for each individual motor. The strands are looped in place without any pulling tension, and are held on their clips with a wrapping of soft wire wound in notches in the horns on the clips.

The motors are wound individually with a wheel drill, as with a model airplane. Be sure the motors are wound in the right direction and the same number of turns to each. Stretch the bands well while winding.

Use Graphite on Bands

It is well to treat the rubber bands with rubber lubricant—powdered mica or flake graphite. Under ideal conditions each motor can be wound nearly 2500 turns. The potential energy thus stored up, if used sparingly, in conjunction with the free wheeling, will give the midget car a three-mile range of travel.

A rubber band motored midget car is subject to a wide variety of designs. Perhaps the reader can think up a better design than this. Maybe a friction drive "job" with a wide range of driving ratios might be better.

No doubt more individual motors and a higher gear ratio would increase the travel range of this model. A commendable point of the design presented is that the driving gears are subjected to no end thrust, since the motors pull equally on both ends of the shafts. Keep this in mind when you design a car.

When a boy in any neighborhood builds a rubber band motored midget, his playmates are bound to follow suit. Competitive races are bound to ensue. Who knows but that we may have professional midget races? They race turtles nightly in Hollywood. Why not midget cars?

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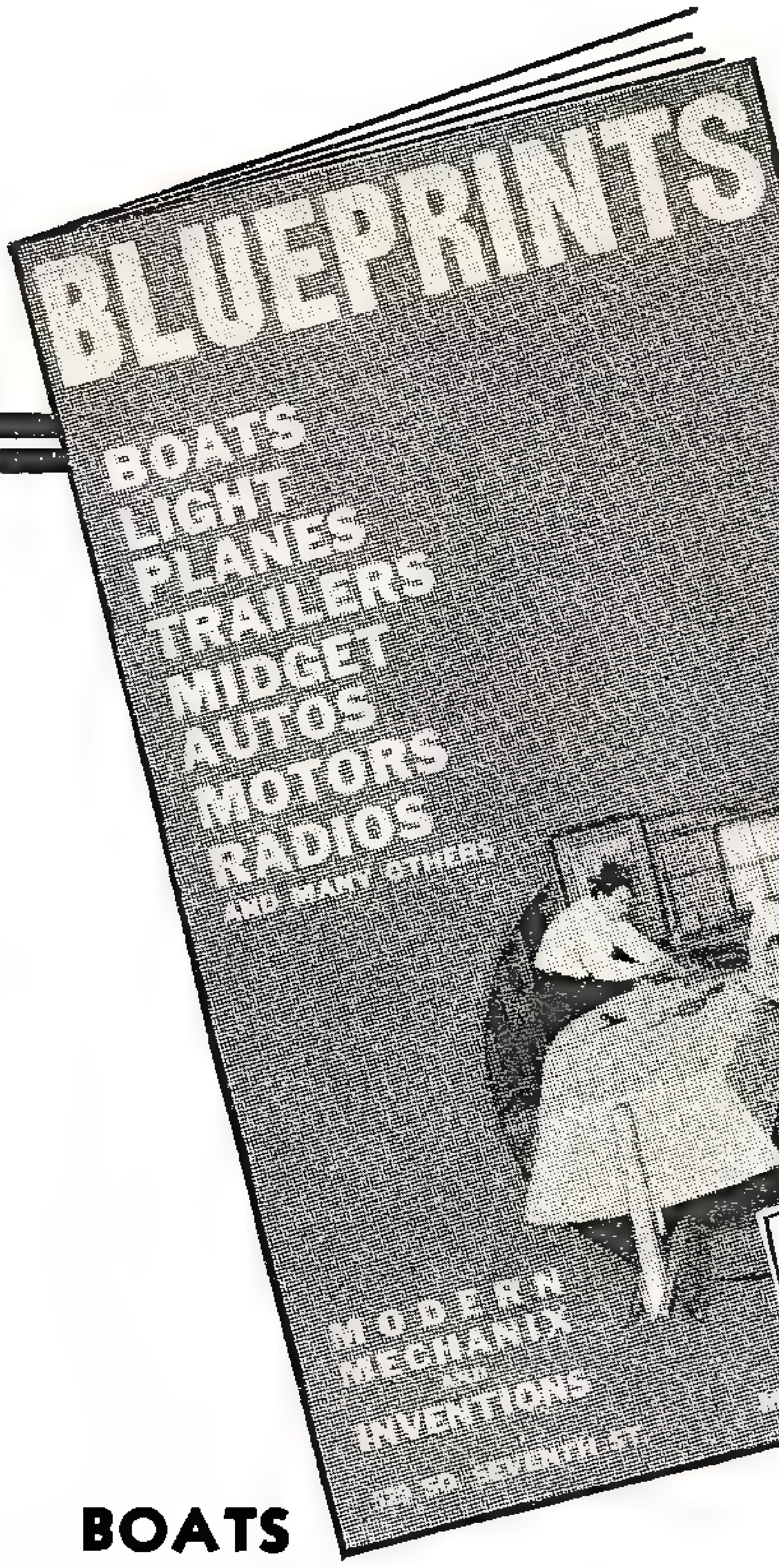

Just off the press—this new, lavishly illustrated booklet, showing photographs and descriptions of fascinating projects for the craftsman to build, on which genuine shop blueprints are available! Real projects for real builders—boats, light airplanes, trailers, and other man-size items. Every print listed is what is known in the trade as a "blue-line print," which is more expensive to produce than the ordinary blueprint, but more easily read. A copy of the Blueprint Booklet is waiting for you—ask for it, or send in the coupon below!

Some of the Plans shown:

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DOROTHY—A Cruiser
Primarily a power boat, designed for cruising economy, not speed. Good for 9 miles an hour with a 10 h.p. marine motor. Ford can be used if desired. Dorothy has a sail if the motor quits. She's 24-foot, plenty of cabin room for two or more; a real deep-water performer. Prints $2.50

WHIZZER—Air-Driven
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BUDDY—18 Ft. Single-hander
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PUNKIN' SEED
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RACING ICE YACHT
An iceboat of 175 ft. sail spread which cleans up in racing competition. New lumber for this job costs about $8. Designed by an experienced ice yachtsman who has turned out the utmost in speed and stability. Price of prints........$1.00

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SHORT WAVE RADIO CONVERTER
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LONG HARLEQUIN MOTOR
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CAMPING HOUSE-TRAILER
Just the thing for vacation-time—a trailer with beds and household equipment, with a collapsible canvas roof and sides which fold up when not in use. Four or more can sleep in her. Price of prints $1.00

M-M SPORT ROADSTER
Blueprints, with full instructions for building, on an amazingly snappy and inexpensive job. Uses a motorcycle engine for power, chain drive—capable of 65 miles an hour, and looks like a custom built factory job at one-tenth the price! Price of complete prints $2.50

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Making "Ghosts" for Parties

(Continued from page 84)

We were now instructed to place one hand on the table with the other hand placed over it. In this position we were to ask questions, either outspoken or mentally, and our "affinity spirit" would answer them with a touch on the back of our. hand. One touch meant "no"; two touches, "yes."

When it came my turn I soliloquized the mental question: "How the devil does she do it?" A moment later I felt two clammy touches on the back of my hand. That meant "yes." Were the spirits kidding me? In the green glow of the neon light I had watched my hand unblinkingly. The light was ample. Yet, when the touches came, I didn't see a darned thing. It was uncanny.

The meeting came to a close after "Madame" had given us her private consultation hours.

On the way back to town, Eddie finally broke our mutual silence. "How the devil does she do it?"

"I don't know—exactly. But I've got a hunch. We'll see in a day or two. As I say, it's only a hunch, but . . . "

* * *

Can you blow smoke rings? Do smoke rings fascinate you? They always did me. When I was a little shaver I made smoke rings. No, I didn't smoke—not then. I'd get an old card-board shoebox, cut a circular hole about 1½" in diameter in the lid, and then get my dad to blow cigar smoke into the box. Then I'd give the lid a smart tap with my finger-tip, and out would pop a perfect smoke ring. In a still room it would rise to the ceiling without losing its form. Try this little trick yourself. It's entertaining.

"Madame's" descending, nebulous halos somehow brought to my mind my early experiments with smoke rings. I decided to do a little advanced experimenting along that line. So I made a little device which I call a gas ring pistol. A simple thing! Cost 15c: 10c for a pair of 4" embroidery hoops, and 5c for a toy balloon. Note the sketch. A piece of stiff drawing paper is rolled into a funnel 4" at the big end and 2½" at the small end. A pair of 4" embroidery hoops holds the balloon rubber tautly across the big end. A wooden disk ⅛" thick and with an 1¼" center hole is glued into the small end. The edge of the 1¼" hole is faced with woolly material. A crude handle is glued to the truncated cone. The handle is hollowed out for reasons explained later.

There! We have a gas—or smoke—ring pistol. Blow several mouthfuls of smoke into the conical chamber. Then give the rubber diaphragm a smart tap with a finger-tip. Out pops a perfectly formed smoke ring. In a still room these rings will travel horizontally for ten feet or more before diffusing into the atmosphere. The nicety of these rings is probably due to the fuzzy nap on the woolly cloth which lines the hole. This serves well to retard the outer edge of the column of gas passing out the hole.

I reasoned: "If this pistol shoots smoke rings, why won't it shoot other gaseous rings as well?" It will. Ammonia rings can be shot which, literally, will make a person gasp. Black rings can be shot by filling the chamber with smoke made by burning a mixture of kerosene and gum camphor. But the best stunt of all is to shoot rings of carbon dioxide gas. This gas is much heavier and denser than air. I reasoned that it would hold its ring shape better. It does. The most readily available source of carbon dioxide is from the evaporation of carbonic, or "dry" ice. This is made by the multiple compression and cooling of carbon dioxide gas, until it is finally solidified. It is intensely cold—110 degrees below zero. Obviously, the gas rising from it is very cold, too.

"Dry" ice is available in most cities. I obtained a piece, broke it into smaller pieces, and put them into the handle of the gas ring pistol. The vapor rising from the ice filled the chamber with chilly carbon dioxide gas. Playfully I shot a ring at the back of "the wife's" neck—about ten feet away. I didn't see a thing move through the air, but presently "the wife" gave a startled squeal and clapped her hand to her neck, proving conclusively that the rings carry their cold with them. "The wife" wasn't half as enthused over the experiment as I. I got "one of those looks," and beat it.

One of these pistols will afford a world of fun. A little perfume can be put in the chamber, and an "aroma ring" can be shot to any individual in a room. Another interesting stunt is to shoot out candles with the carbon dioxide gas. Since this gas will not support combustion, if the gaseous part of the ring passes through the flame, the candle is snuffed out. Another new game for winter entertainment—missileless target shooting!

Now, if a pistol with a 1¼" opening functions O. K., why wouldn't a "mortar" with an 8" or 10" opening function as well? It will. And pop out "halo" rings equal to "Madame's". In fact, I guess there is no limit to the size that gas rings can attain. Did you ever see a shifting engine in a freight yard shoot black, sooty rings a hundred feet or more in the air?

* * *

Next Wednesday night at "Madame's"! The same crazy-quilt room. I studied the ceiling while the white lights were on. Just as I thought! The circular patches in the ceiling pattern were removable lids, lifted by a confederate in the room above. The faint scratches on the paint of the disks confirmed this. The seemingly disordered pattern of the ceiling was so laid out that there was a 12" circular opening above each chair on both sides of the table. One opening served for both seats at the end of the table. That was why the ring sometimes came down slightly diagonally.

The chafing-dish steamed on the side table. Of course! The air in the room had to be moist so that the cold, descending carbon dioxide rings would form foggy halos, and afterward dissipate without leaving a trace.

"Madame" swished into the room and took her accustomed chair. The white lights were turned off; the neon on. Clever stunt—the neon light. The fact that there was no reflecting surface on the furniture and fittings, and the semicircular shield over the tube, kept the upper part of the room in complete, impenetrable darkness.

(Continued on page 142)

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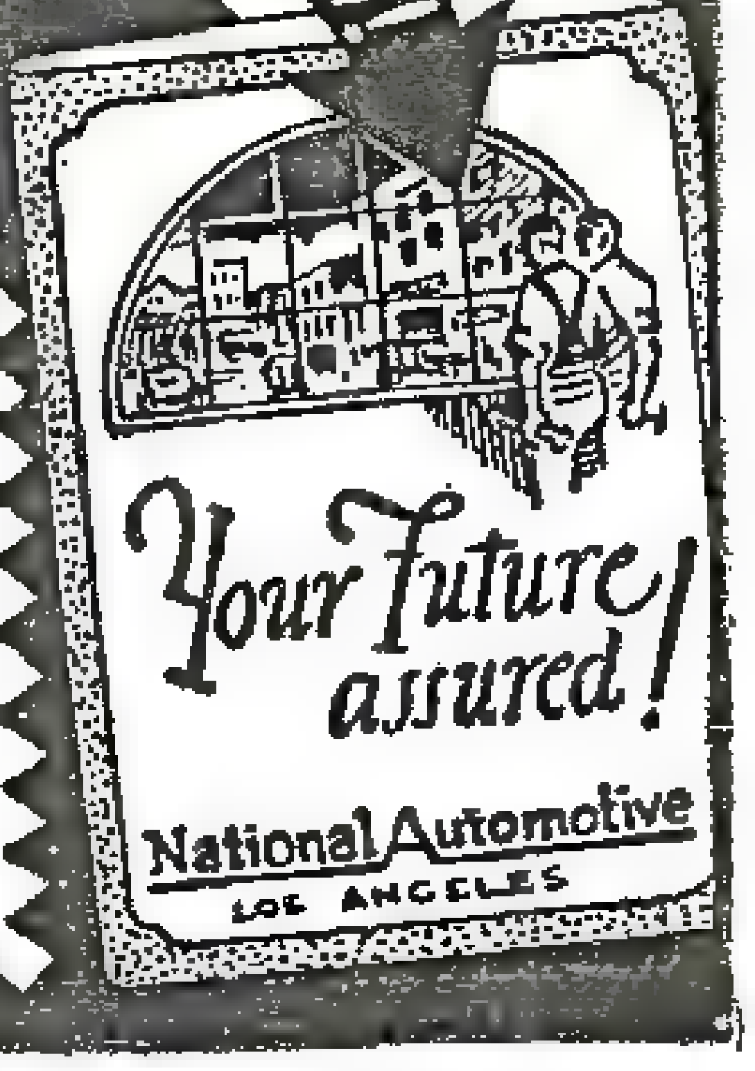

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Fortune Making Ideas for Inventors

(Continued from page 119)

may place either a letter or a small package and have it properly weighed and stamped after the proper amount is indicated on a dial.

Then the mailer need only insert the proper coin and his letter drops down into a chute to await collection. Today we have all the necessary electrical devices to bring this result about. It will simply take some ingenious fellow to assemble what has already been perfected into a new combination of elements.

Specifications: Should occupy a rather small space and should not be too complicated. Should be able to handle packages up to one pound and should not cost over two hundred dollars to build.

Exploitation: Should be patented only in the United States and may be either privately exploited under the auspices of the Post Office Department or sold to the United States Government.

5. Furnaces That Need Not be Cleaned

Hot air furnaces must be cleaned out at least once a season and more often than that if the fire did not have to be extinguished. By the middle of the winter every furnace in use has accumulated a thick coating of soot and foreign matter that has a low thermal transmission capacity and the result is the furnace starts to insulate itself from its surroundings.

What is needed is either a way of filtering this out of the furnace as fast as it is formed or else having a lever so arranged that when it is pulled, the soot will disappear down a chute and into the ash pit.

Specifications: This system cannot add over five dollars to the cost of building a hot air furnace and it should be a purely mechanical application. The design of the furnace might be changed in such a fashion as to automatically take care of this.

Exploitation: Should be sold outright for $25,000 and should be patented in the United States and Canada. Furnaces of this type are not used in Europe.

6. Non-slipping Floor Polish

If I knew a bit about chemistry I would set out to lick this problem, for I know the result would be worth a young fortune. Count the lady friends and housewives among your own acquaintances who will not treat their floors with wax because it is dangerous. Wax does have the advantage of keeping a floor in good appearance and preserving it but it has been responsible also for a great number of serious accidents.

Why is it not possible to find something, somewhere, that may be added to the wax and that will not detract from its ability to keep floors in the proper condition and yet will prevent the wax from becoming deadly underfoot.

Specifications: The materials used should be inexpensive, should have no odor and should not harm wood. It should also be colorless.

Exploitation: Should be patented in all of the countries of the world and should be licensed only.

Fortune Making Ideas for Inventors

7. *Pin-less Price Tag*

Here is a simple thing and yet it has escaped the attention of inventors for years on end. We need a new kind of price tag that will not make holes in the garments or articles upon which they are used. They could be sold to department stores by the countless millions and I feel sure that the inventor could roll up a tidy bank roll if he could solve the problem.

Specifications: Must use no pins or clamps. Should in no way damage the garment and should be easily removed. Cheapness is a great factor and the cost should be a small fraction of a cent.

Exploitation: Should be patented only in the United States.

8. *Sewing Machine Stitch Locker*

I wish I had but one-hundredth of the money that has been made by the inventors of devices that could be used on sewing machines, to say nothing of the great fortunes that were piled up by the pioneers. There is still a great opportunity in this field. What is needed is a simple attachment that will lock the last stitch—that is, prevent the thread from coming loose.

Specifications: Should cost not more than a dollar and should be fashioned so that it could be applied to any machine regardless of manufacture. Might be made of pressed metal to keep production costs down to a low figure.

Exploitation: Should be sold on a royalty basis with $5,000 down payment and 3% of the retail price of each article. Should be patented only in the United States.

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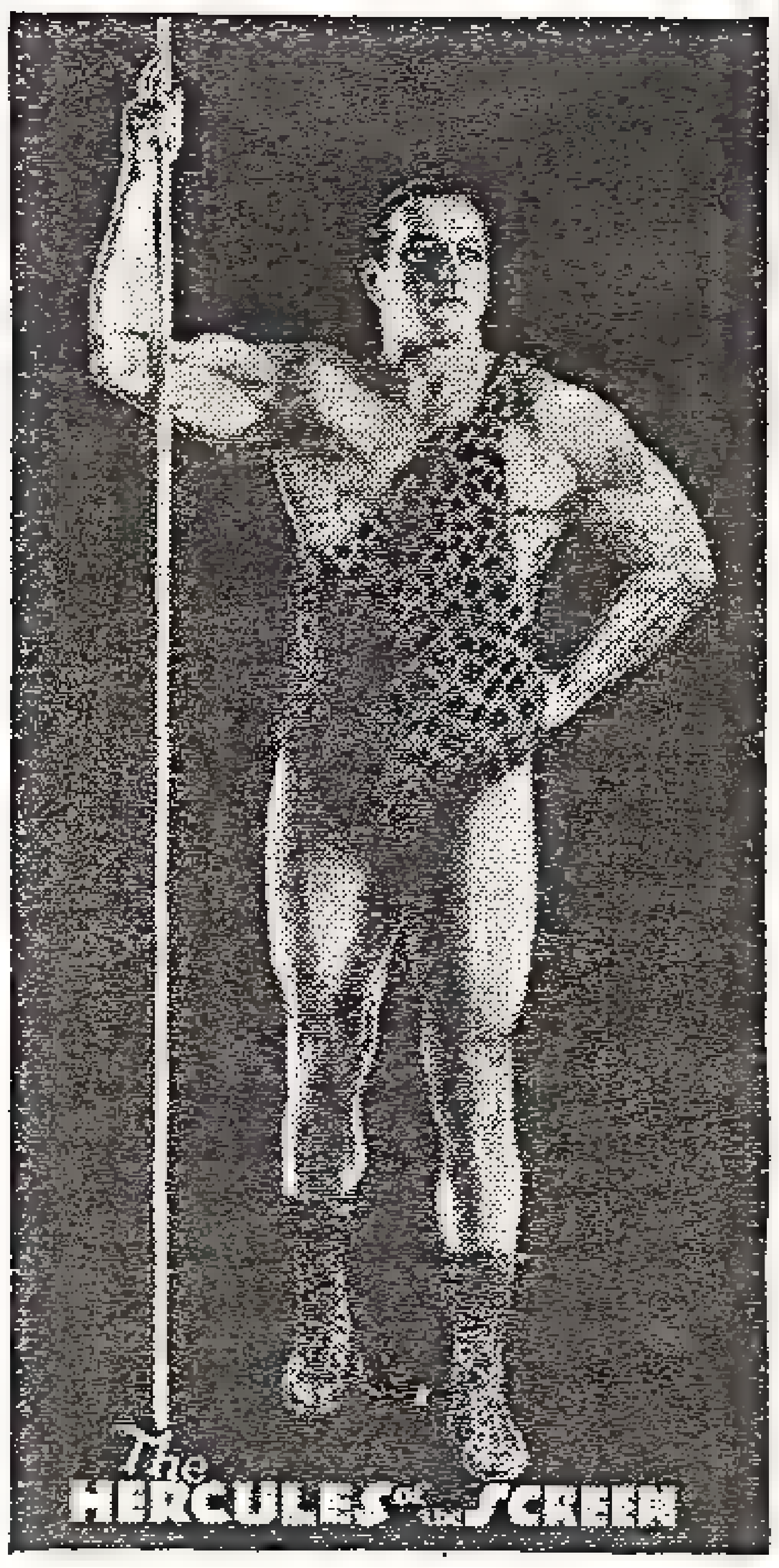
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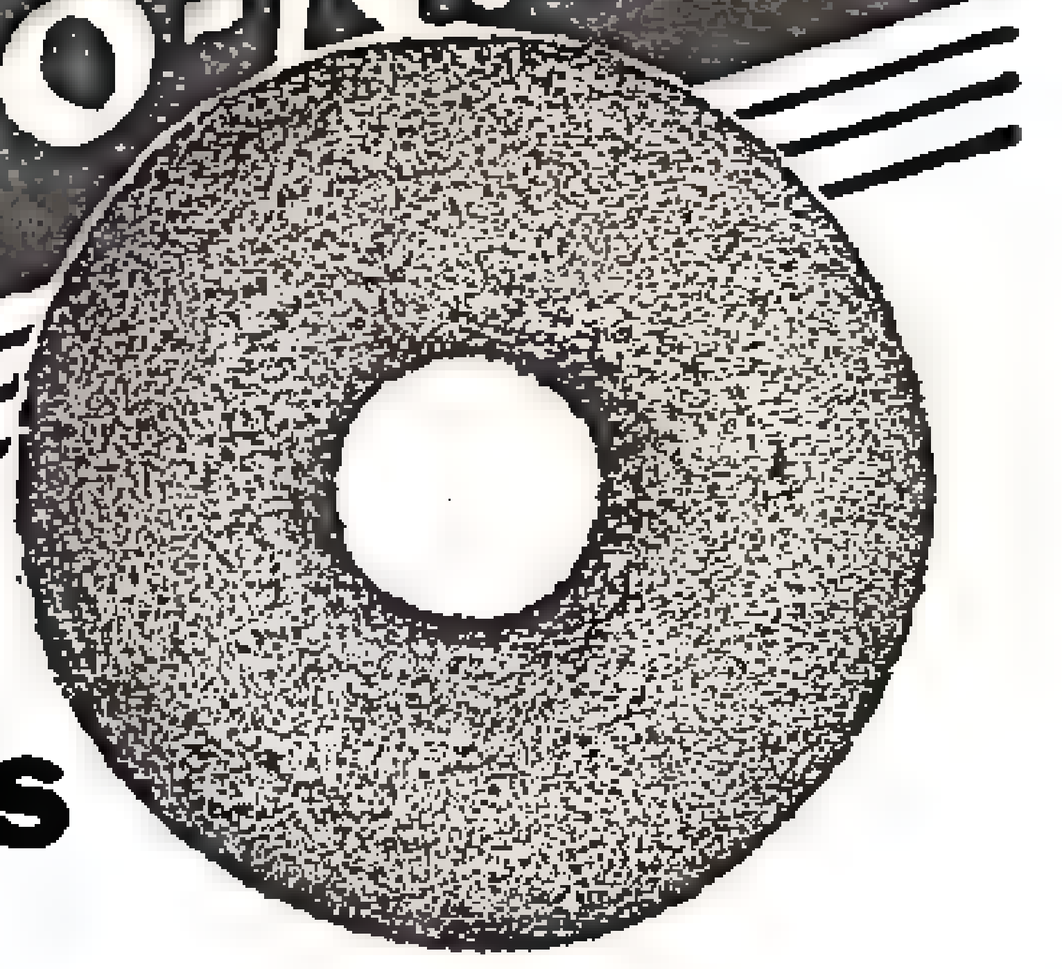

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Making "Ghosts" for Parties

(Continued from page 139)

The show was on. Neither Eddie nor I was embraced by ghosts.

The meeting broke up. We donated a buck apiece. "Madame" didn't even say "thank you." Instead she gave me a wicked look. For she knew that I knew what she knew!

"Well, did you prove your theory?" Eddie asked when we were outside.

"Absolutely. The visible 'halo rings'—the 'ghost rings'—were popped out of a device just like the smoke ring pistol I showed you—only much bigger, of course. Probably about a foot in diameter. The carbon dioxide is much heavier than air. Naturally the rings settle down. The icy cold gas in contact with the damp air made the rings slightly visible—filmy, ghost-like. When the gas diffused in the air, all visibility was gone.

"Regarding the 'spirit touches' on the back of the hand, I could reproduce those with that little smoke ring pistol of mine, shooting them from port-holes in the ceiling. The fact of the matter is that the sensation of a light touch and of a change of temperature are almost the same. Momentarily both sensitize only the surface nerves of the skin."

"How do you know they were rings, though?" Eddie asked.

"Well, you see I brought a little, fluffy feather with me and placed it on the back of my hand. When I got the 'spooky touch,' it whirled round and round a couple of times, and then floated off the table with a flow of gas. Carbon dioxide is much heavier than air, and flows almost like water until it diffuses in the air.

"The 'Madame' saw my little trick through her half-closed eyes. I saw her face twitch with anger. But she couldn't say anything. However, I have a strong hunch we will not be welcome there again."

So much for "Madame" Y's spooks. I simply have no luck spook hunting. For fifteen years I've been hankering to meet a real, honest-to-goodness ghost. If any readers have the acquaintance of any ghost, spook, goblin, banshee will they please arrange an introduction for me? And if Madame Y— out on Santa Monica Boulevard reads this, will she please please accept my profound thanks for two very entertaining evenings. Best amusement I ever had for two bucks.

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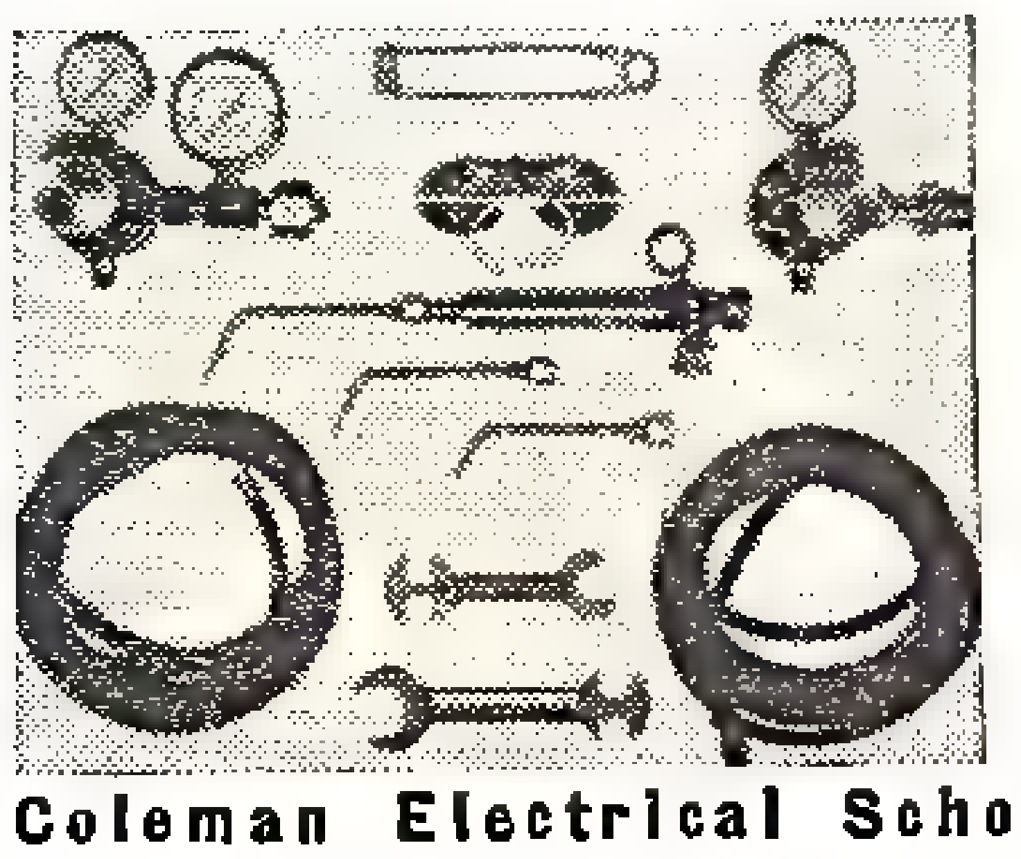

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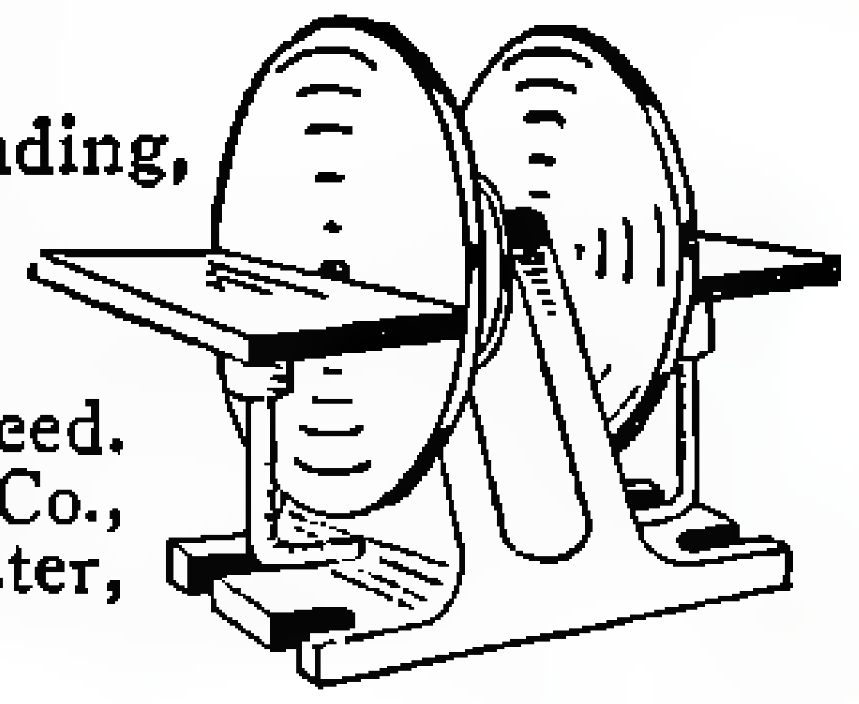

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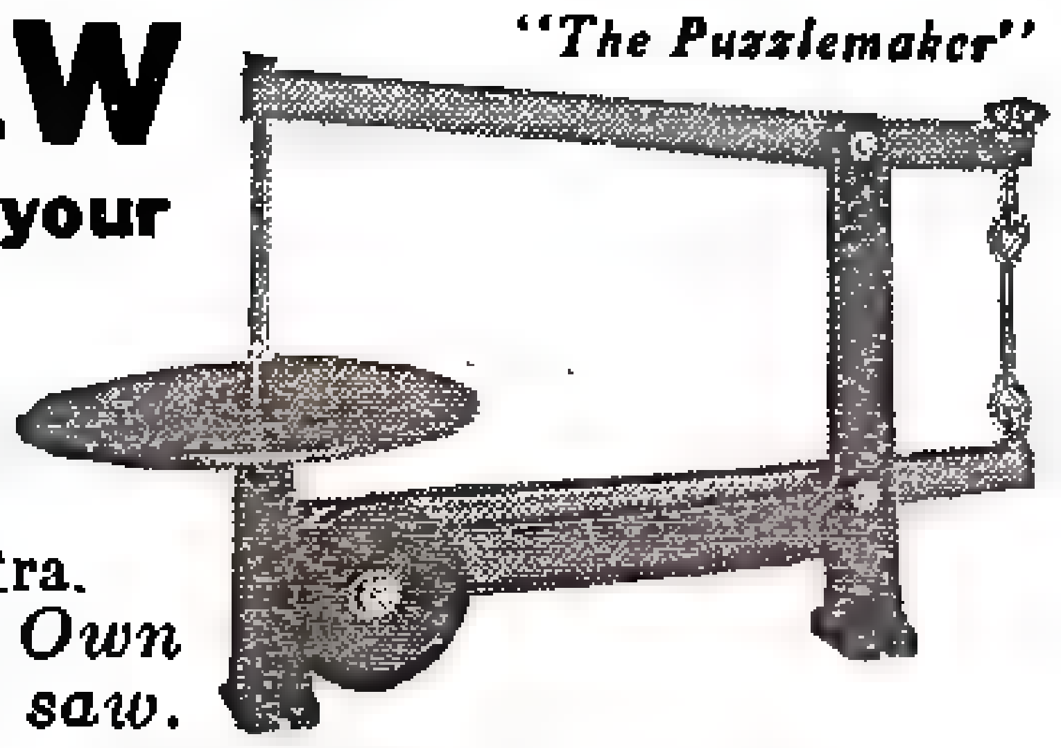

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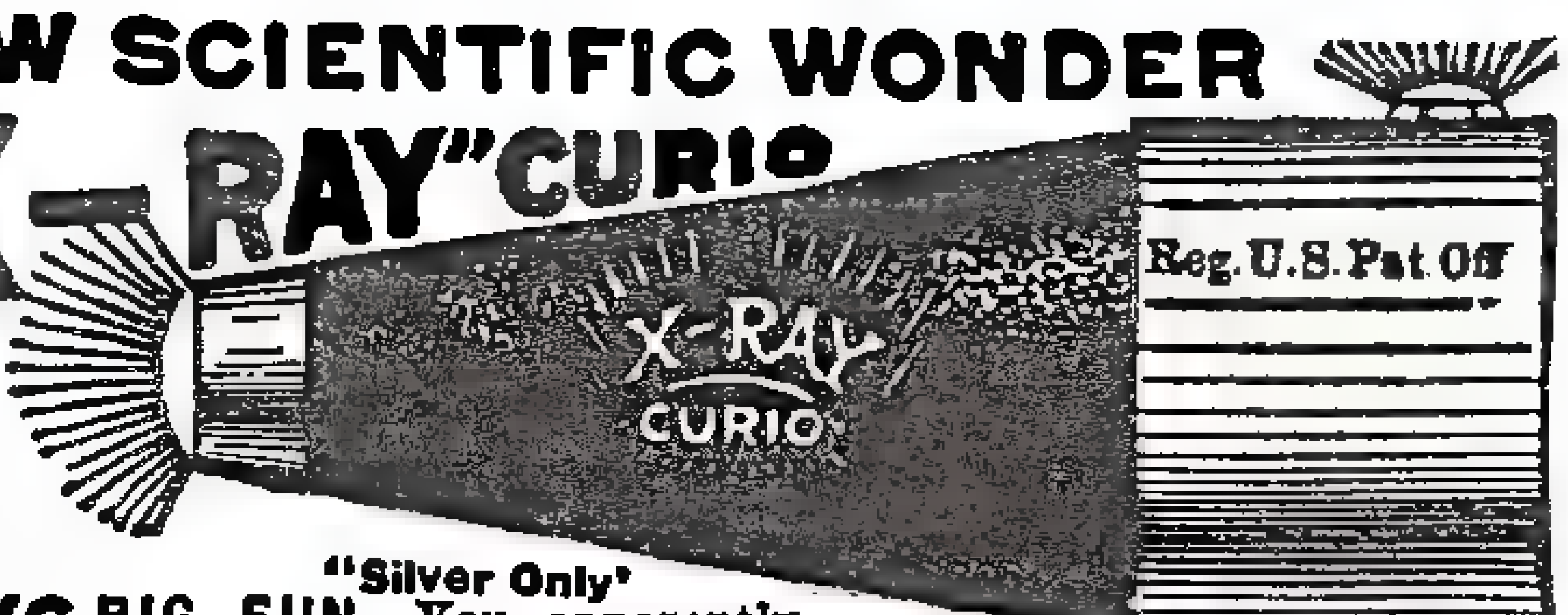

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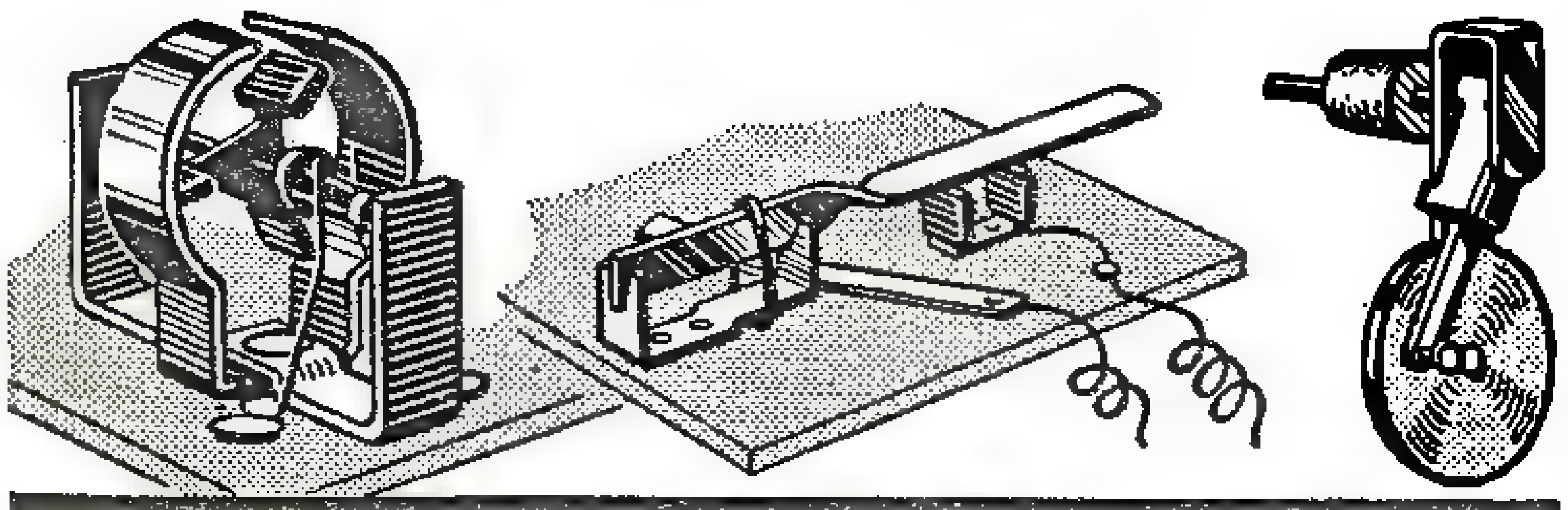

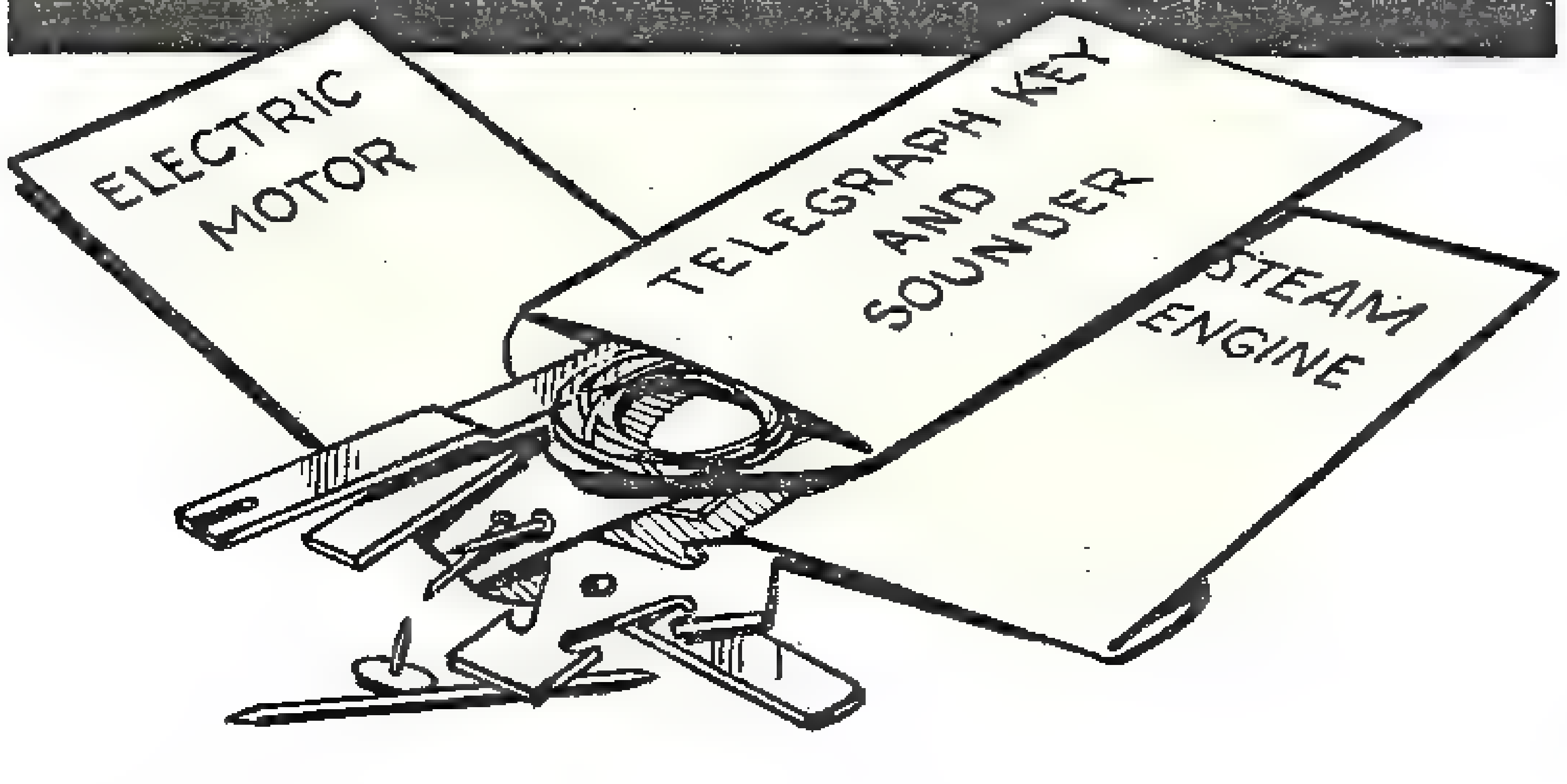

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Engineers Fight Avalanches

(Continued from page 56)

the occurrence of avalanches are issued by the meteorological service, and in the Austrian Alps, on the Tamischbachturn Mountain, a recently established observatory is devoted entirely to the study of snowslides and means of diminishing their dangers.

On mountain railroads, in both Europe and America, tunnels and snowsheds furnish a partial protection from the unstable snowfields. American lines crossing the Continental Divide have spent many millions of dollars on the construction and maintenance of snowsheds. On the Great Northern for ten miles down the western slope at the end of the Cascade Tunnel, 76 per cent of this distance has been protected at a cost of nearly $1,500,000. The sheds on this line have concrete retaining walls and a timber roof designed for a load of 1,500 pounds per square foot.

The most extensive system of sheds, however, is that of the Southern Pacific between Blue Canyon and Truckee, at the crest of the Sierra. The snowfall in this district is hardly surpassed anywhere in the United States, amounting in some years to more than 65 feet. To cope with this extraordinary situation the railroad has built more than 30 miles of snowsheds in a distance of 41 miles. They contain 100,000,000 feet of lumber, and their protection against fire in summer is a big item of expense.

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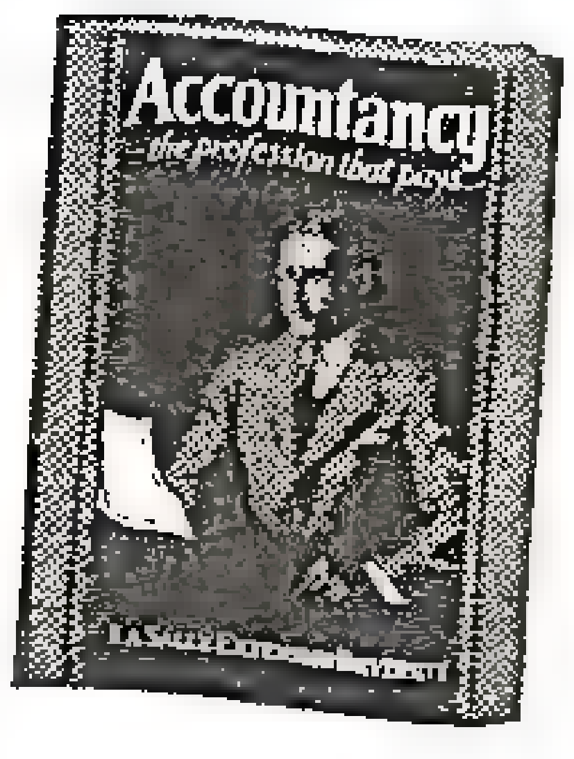

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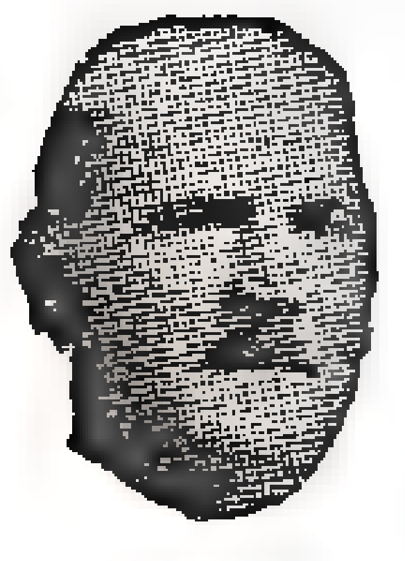

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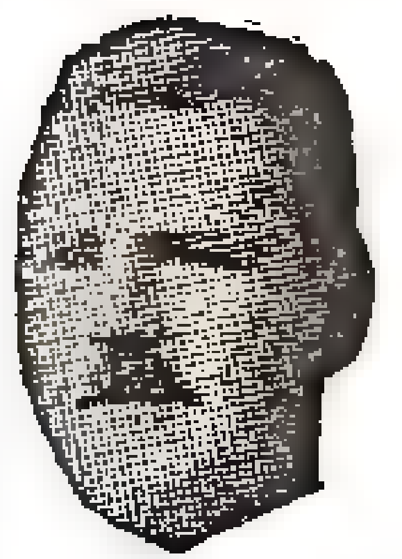

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Makeup Secrets of Horror Pictures

(Continued from page 47)

paper. The dark brown of a pencil accentuated this slit to give a death-like appearance of slightly opened eyes. Now, as he lay in the coffin awaiting his cue to be reincarnated, the mummy was complete.

Temporary plastic surgery changes many an actor's face. Not long ago Pierce added a half-century to an actor's face by pulling down the lower eyelids with fish skin held in place by liquid adhesive and making him up with standard grease paints, properly shadowed and lined to achieve the appearance of age. All this takes place in the makeup room under lights duplicating in intensity and color those to be faced on the set.

But the superlative in makeup is achieved with the more "outlandish" characters.

When Pierce was asked to create the character of "Frankenstein," he made Karloff's head look as though the top had been removed, a larger brain inserted, and a larger skull put back on. From Egypt came the suggestion. In olden days man were crucified and buried in an upright position. After many years had elapsed the weight of eyelids, mouth and fingers caused them to become enlarged and thicker.

The cotton pad built up Karloff's head, cotton strips supplied scars on the face, putty lengthened the fingers. Since he was to be a man recreated from the bodies of several criminals, brought to life by electricity, he could have no blood—and gray grease paint gave him a flat, lifeless appearance.

People are interested in strange characters. Chaney's great successes and, more latterly, "Frankenstein," produced at insignificant cost, prove the declaration. "Frankenstein" was one of the biggest money makers of the last three years.

All sorts of odd faces and figures have appeared on the screen, all of them grotesque but relatively easy to create—once the makeup artist knew how. A little cloth, hair, putty, glue, grease and paint—that's all.

Consider the monkey face that appeared in one film. It consisted of half mask and half makeup. Pierce built the mask in five pieces, using chamois and rubber sponge. The nose was built on the mask, so located to appear fully an inch higher than the actor's own nose. Padding filled in the mask to avoid hollows around the nose. Leather ears, sewed into the wig, and artificial teeth fitting over his natural upper and lower sets, completed the effect.

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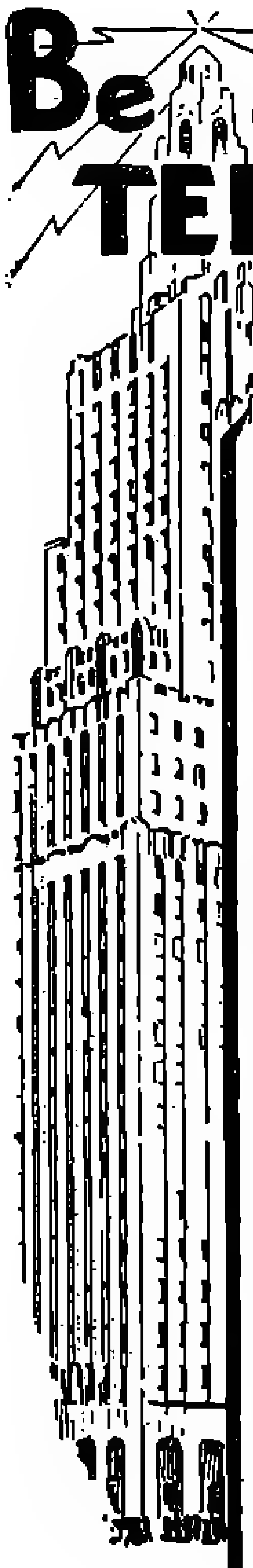

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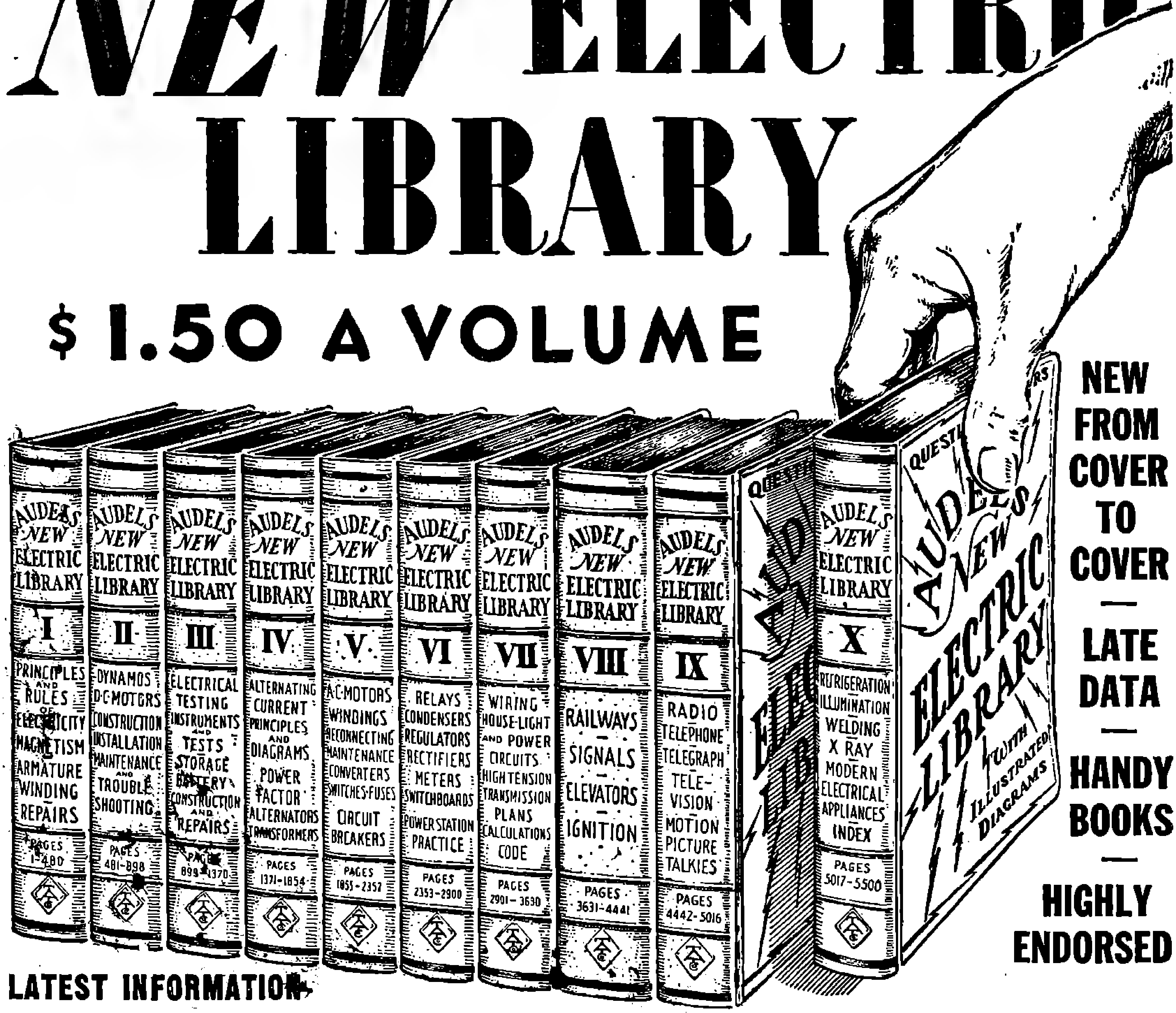
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Here is great news for rupture victims. A two-fold rupture system has been developed, tested by thousands of people. It is based on the remarkable record made by Dr. Jay W. Seaver at a great eastern university, and a special new kind of way to support rupture. You do not have to wear leg straps, torturous springs or cruel hard pads. Instead, Suction-Cell Retainer provides deep-tissue support for your rupture. A special offer is now being made to truss victims. That offer says that unless your rupture is actually and decidedly reduced in size within 30 days after wearing Suction-Cell Retainer, it does not cost you one penny. Read below the details of results accomplished by Dr. Seaver and then mail coupon immediately for free proof offer.

SCIENCE is every day making new accomplishments. Dr. Seaver's records have shown that he actually cured rupture among the students of the University in more than 7 out of 10 cases. Some of them were baseball players, some gymnasium performers and others athletes engaged in strenuous exercise. He not only freed them from having to wear trusses but allowed them to go ahead in their exercise. Now, thanks to another man widely experienced in rupture relief, the essentials of the Dr. Seaver methods are available to everyone, with the radically different Suction-Cell idea for retaining rupture.

Suction-Cell Retainer has nothing to do with medicines nor pastes, and can be used without cumbersome straps or elastics, weighs but a few ounces and is not noticeable through the clothing. Rupture sufferers and people wearing it say they scarcely know they have it on.

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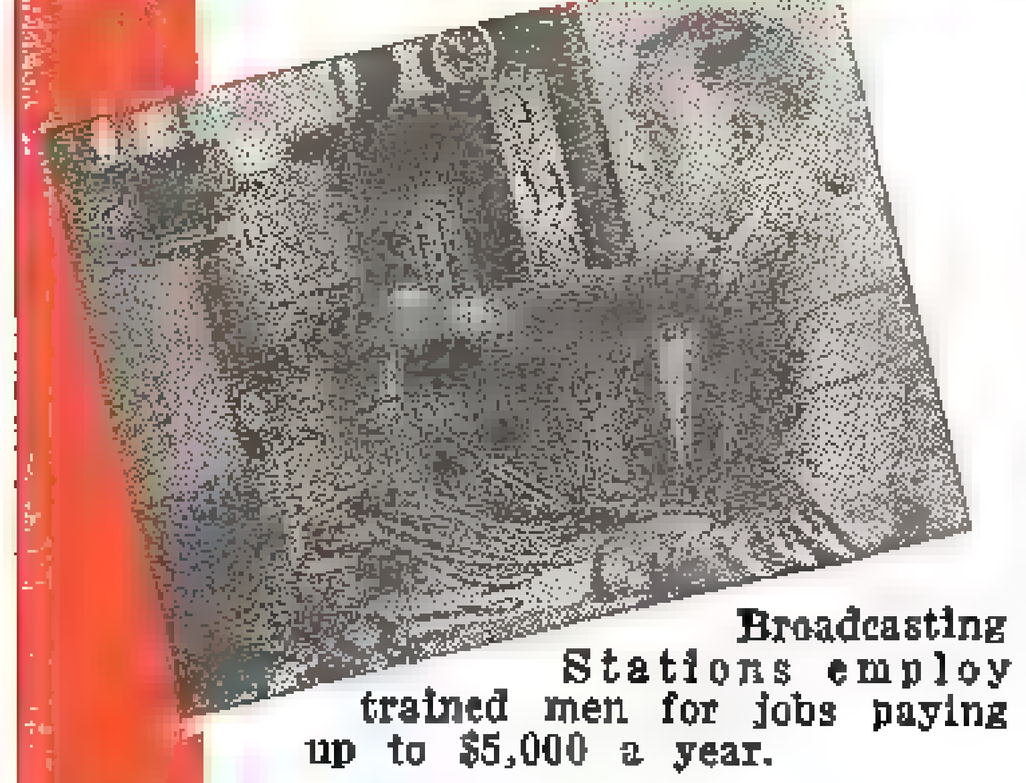


Broadcasting Stations employ trained men for jobs paying up to $5,000 a year.

Television—the coming field of many great opportunities—is covered by my course.

Spare Time set servicing pays many N. R. I. men $200 to $1,000 a year. Full time men make as much as $50, $65, and $75 a week.

Talking Movies—an invention made possible by Radio—employs many well trained Radio men for jobs paying as much as $75 to $200 a week.

My book, "Rich Rewards in Radio," gives you information on the opportunities in Radio and explains how I train you quickly to become a Radio Expert through my practical Home Study training. It is free. Clip and mail the coupon NOW. Radio's amazing growth has made hundreds of fine jobs which pay $50, $60, $75, and $100 a week. Many of these jobs may quickly lead to salaries as high as $125, $150, and $200 a week.

Radio—the field with a future

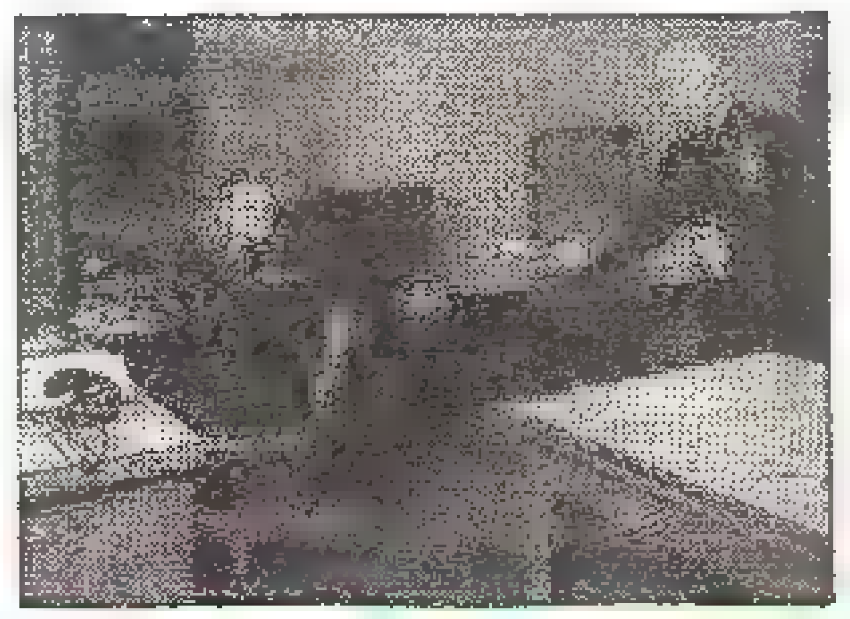
Ever so often a new business is started. You have seen how the men who got into the automobile, motion picture, and other industries when they were started had the first chance at big jobs—the $5,000, $10,000, and $15,000 a year jobs. Radio offers the same chance that made men rich in those businesses. It has already made many independent—will make many more wealthy in the future. You will be kicking yourself if you pass up this once-in-a-lifetime opportunity.

Many Radio Experts make $50 to $100 a week

In a few years 300,000 jobs have been made by Radio's growth. Thousands more will be made by its future development. Men with the right training—the kind of training I will give you in the N.R.I. Course—have stepped into Radio at 2 and 3 times their former salaries. Experienced service men as well as beginners praise N.R.I. training for what it has done for them.

Many make $5, $10, $15, a week extra in spare time almost at once

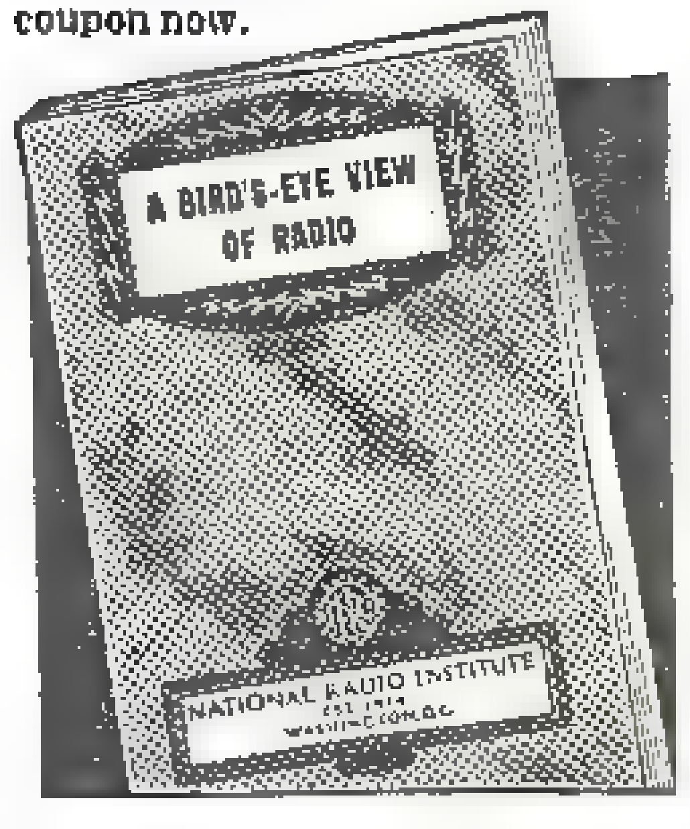
My Course is world-famous as the one "that pays for itself." The day you enroll I send you material, which you should master quickly, for doing 28 Radio jobs common in most every neighborhood. Throughout your Course I will show you how to do other repair and service jobs on the side for extra money. I will not only show you how to do the jobs, but how to get them. I'll give you the plans and ideas that have made $200 to $1,000 a year for N.R.I. men's spare time. G. W. Page, 110 Raleigh Apts., Nashville, Tenn., writes: "I made $935 in my spare time while taking your Course."



Police Departments are finding Radio a great aid in their work. Many good jobs have been made in this new field.

Sample Lesson FREE

I'll send you a Free Lesson to prove that my Radio Course is easy, practical. That's how confident I am that I can train YOU at home in your spare time to become a Radio expert. Only my students could have this book in the past. I KNOW that when you see it, read it, examine it, you will be delighted with its clear, simple way of teaching Radio. I KNOW—because I have ALREADY trained thousands of men. Many of them with not even a grammar school education, and no Radio or electrical experience, have become Radio experts and earn two or three times their former pay. Mail the coupon now.



Some of the Jobs N. R. I. Trains Men For

- Broadcast Engineer
- Maintenance Man in Broadcasting Station
- Installation Engineer of Broadcast Apparatus
- Operator in Broadcast Station
- Aircraft Radio Operator
- Operator of Airway Beacons
- Service Man on Sound Picture Apparatus
- Operator of Sound Picture Apparatus
- Ship Operator
- Service Man on Public Address Systems
- Installation Engineer on Public Address Systems
- Sales Manager for Retail Stores
- Service Manager for Retail Stores
- Auto Radio Installation and Service Man
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- Set Servicing Expert

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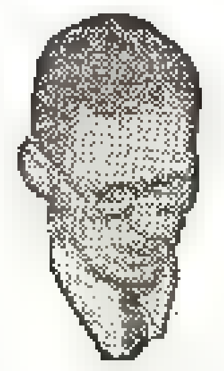
"I spent fifteen years as traveling salesman but could see the opportunities in Radio. I have made more money than ever before. I have made more than $400 each month and it really was your course that brought me to this." J. G. Dahlstead, Radio Station KYA, San Francisco, Cal.



Radio Service Man Doubles Salary

"I spent 15 years building and repairing Radios, but felt I could refresh my memory. Upon completion, I was appointed Service Manager of Parks & Hull. I give N. R. I. full credit for my success—it immediately increased my earnings 100 per cent." J. E. McLaurine, 1611 Guilford Ave., Baltimore, Md.

From $10 to $50 a week in spare time

"Besides being employed by the Power & Light Company to locate Radio interference, I have a service business of my own that nets me from $10 to $50 a week in spare time. I owe all my success to the National Radio Institute, as I was only a common factoryworker." H. L. Penie, 812 W. High Street, Piqua, Ohio.

Get ready for jobs like these

Broadcasting stations use engineers, operators, station managers and pay up to $5,000 a year. Radio manufacturers employ testers, inspectors, foremen, engineers, service men, buyers, and managers for jobs paying up to $6,000 a year. Radio dealers, jobbers (there are over 35,000) employ service men, salesmen, buyers, managers and pay up to $100 a week. Talking pictures pay as much as $75 to $200 a week to men with Radio training. There are hundreds of opportunities to have a spare time or full time Radio business of your own. I'll show you how to start your own business on money made in spare time while learning. My book tells you of other opportunities.

You can learn at home in your spare time to be a Radio Expert

Hold your job. There is no need for you to leave home. I will train you quickly and inexpensively during your spare time. You don't have to be a high school or college graduate. My Course is written in a clear, interesting style that almost anyone can grasp. I give you practical experience under my 50-50 method of training—one-half from lesson books and one-half from practical experiments with equipment given without extra charge. It makes learning at home easy, fascinating, practical.

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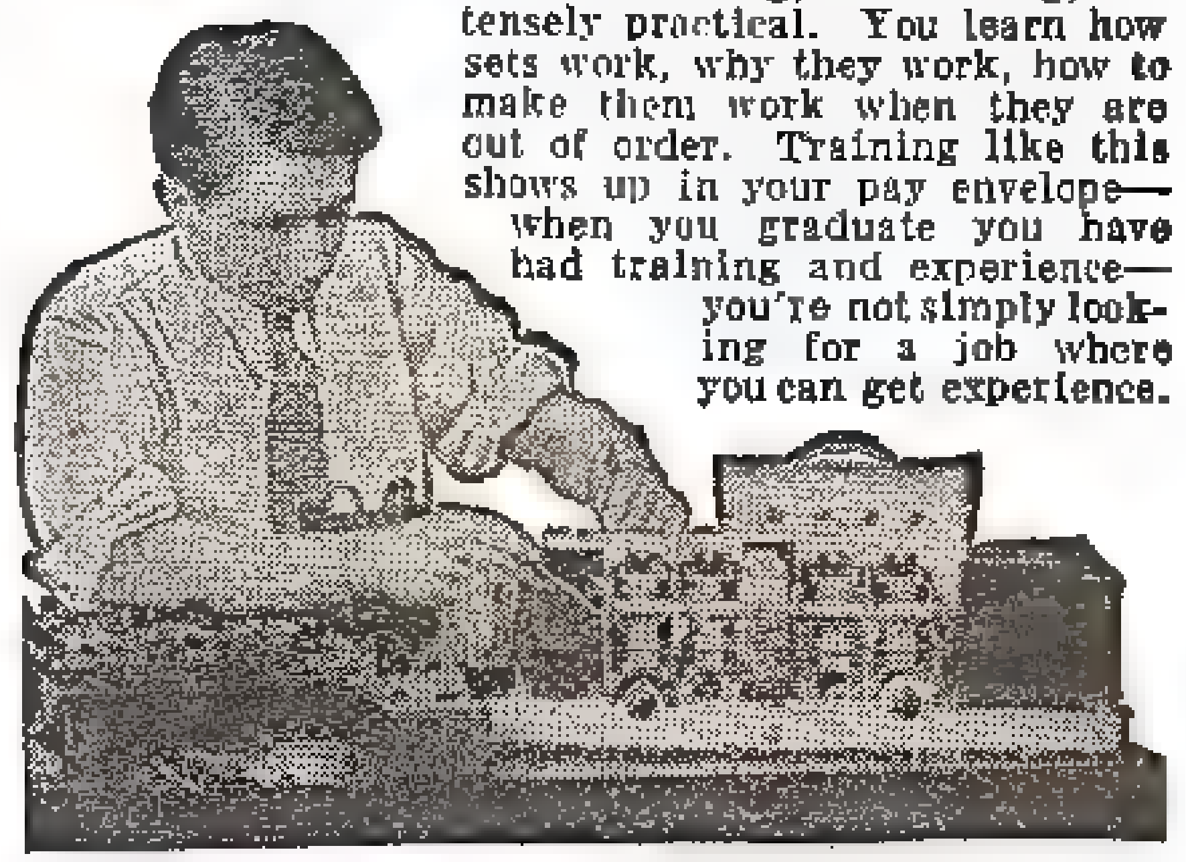

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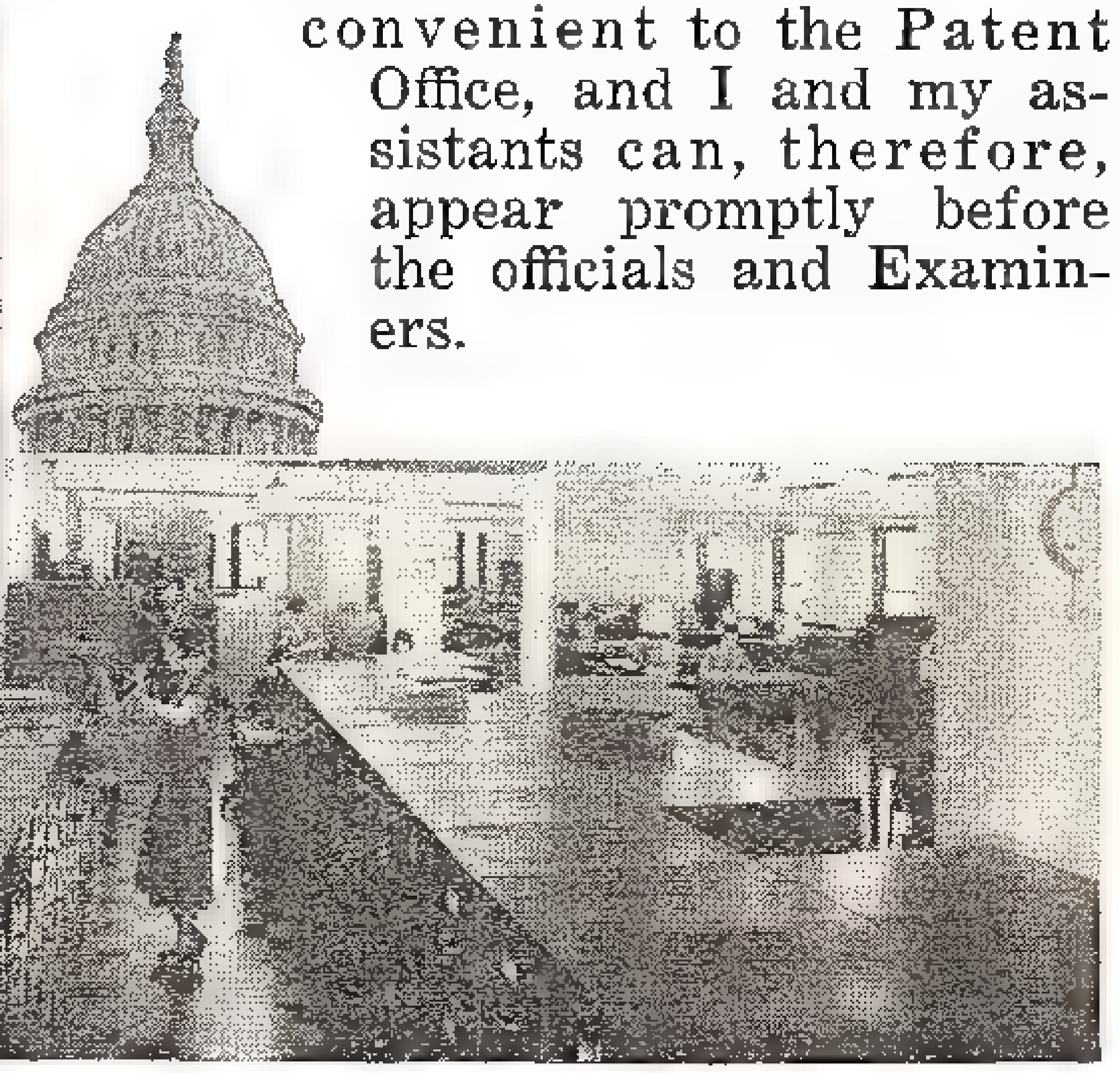

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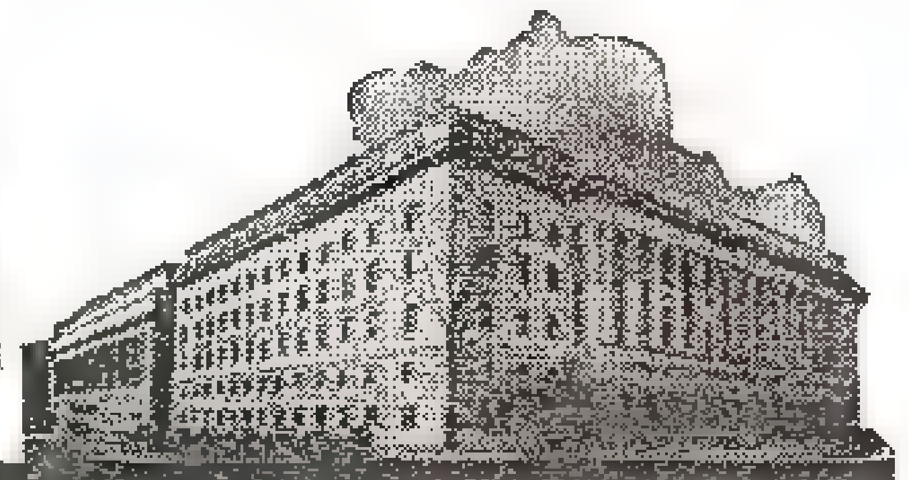

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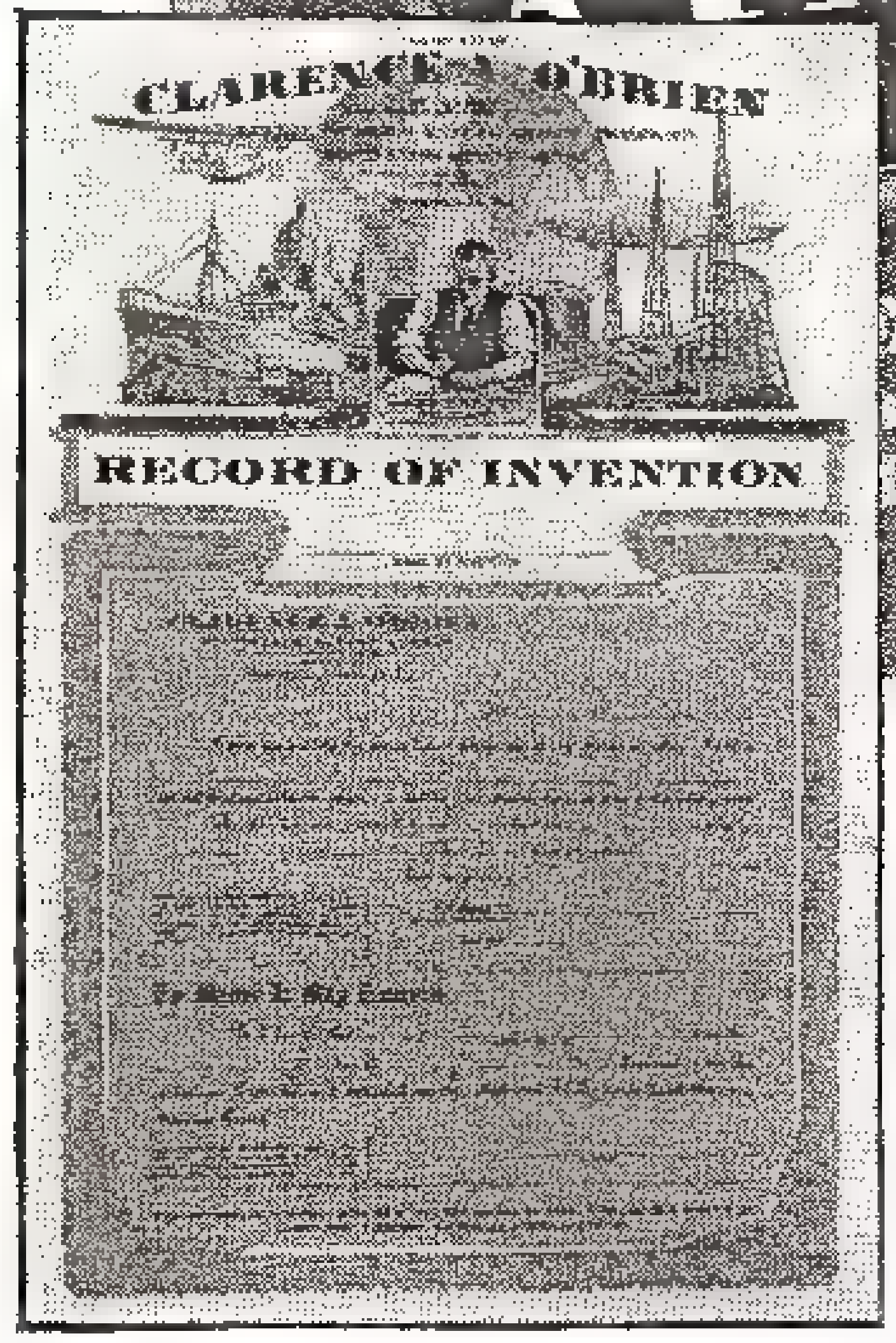
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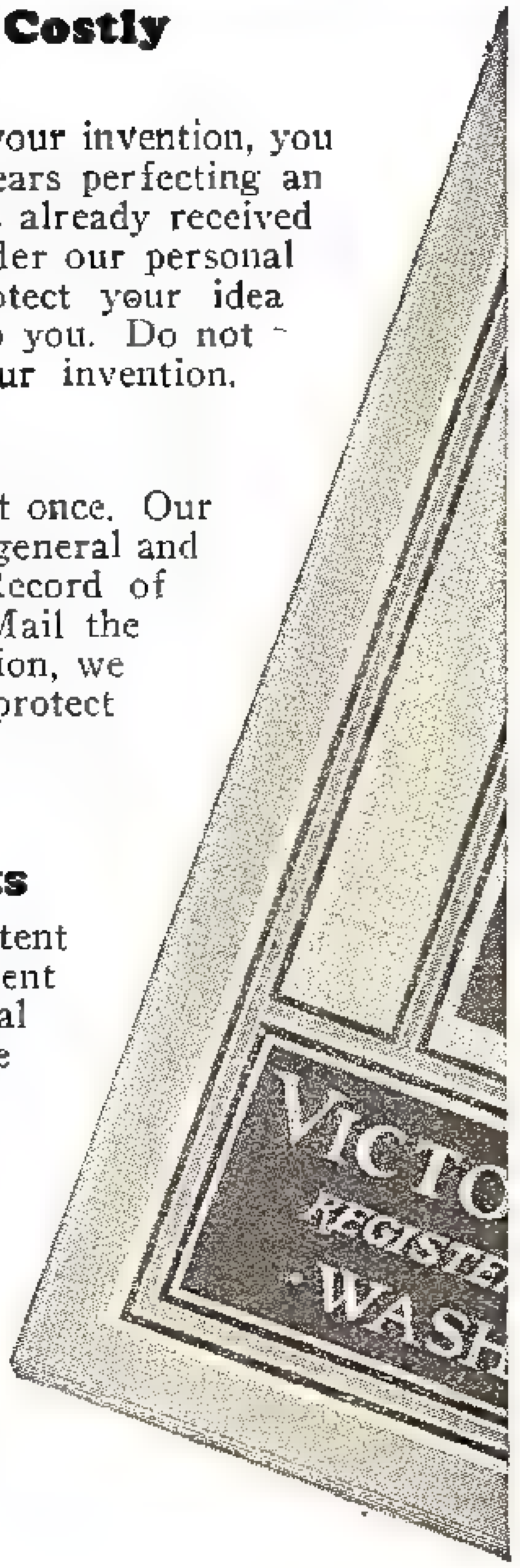

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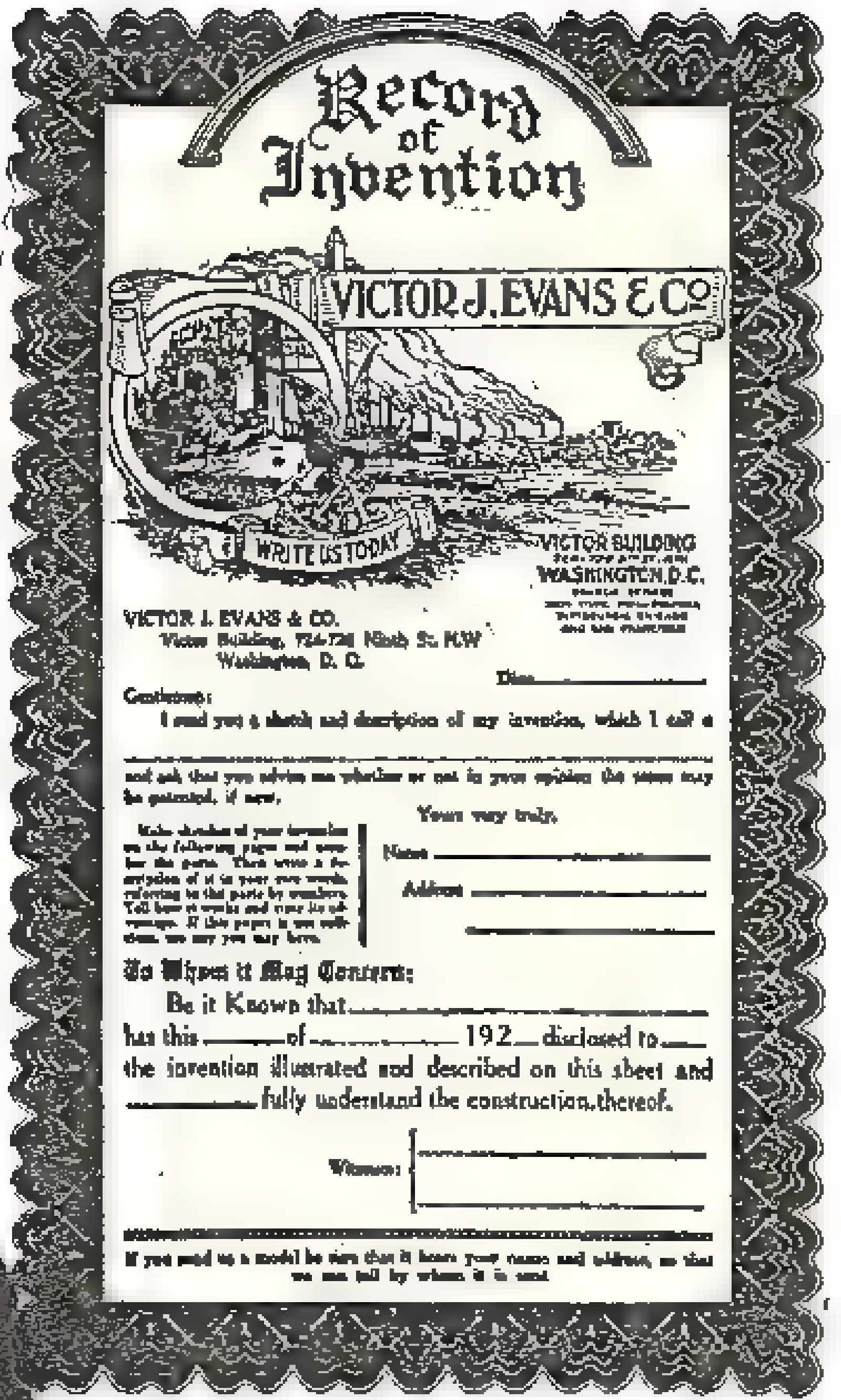

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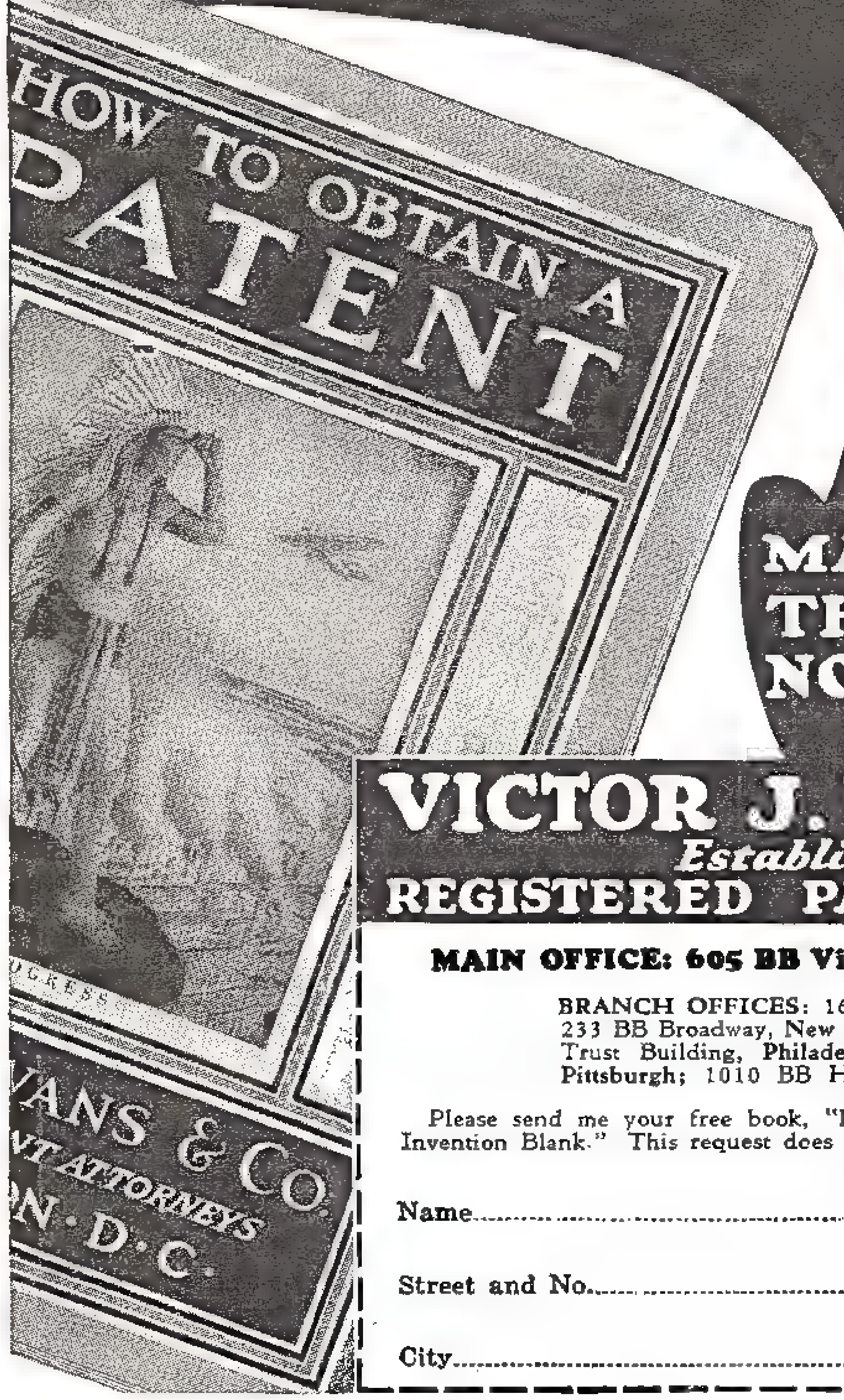

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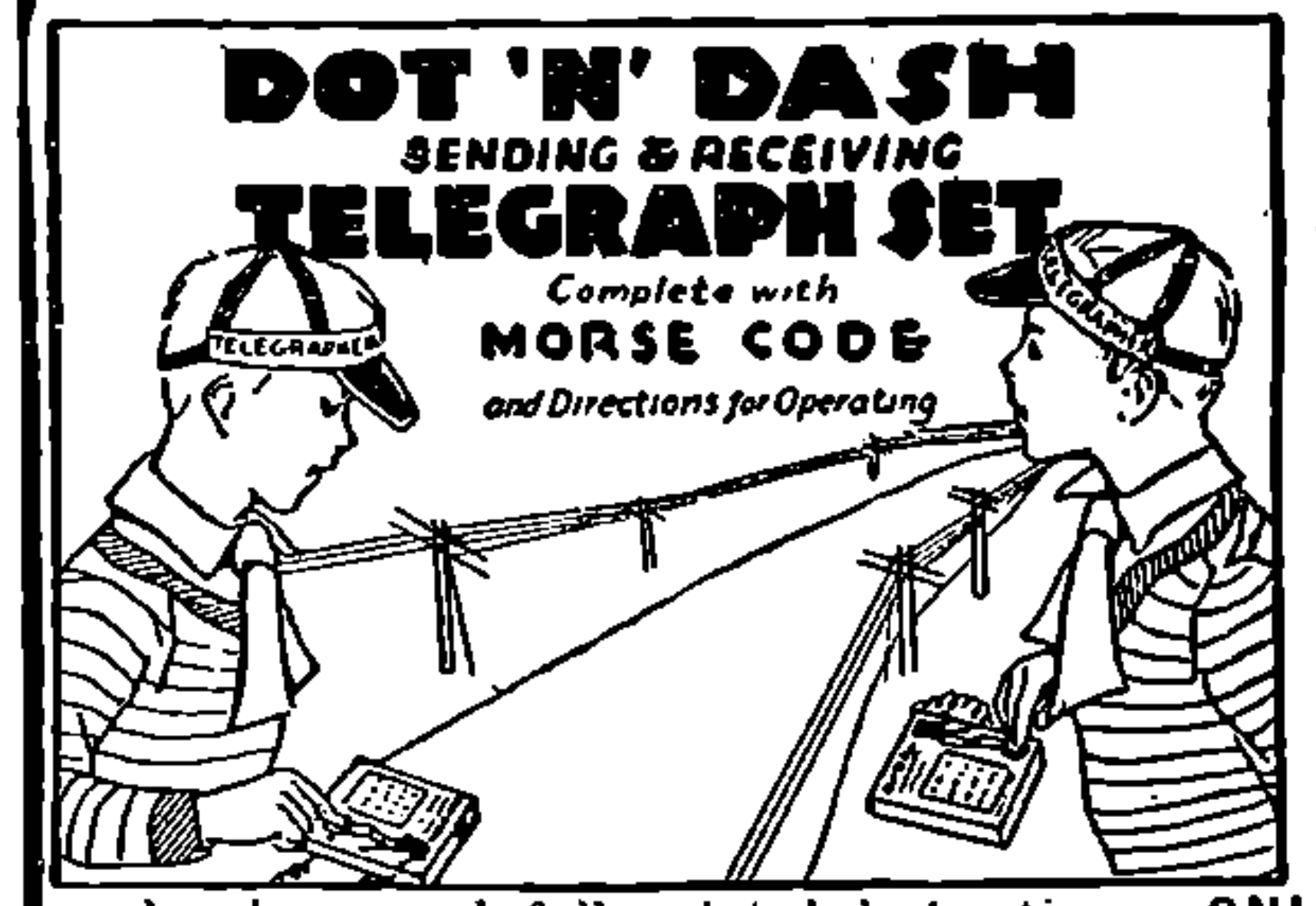

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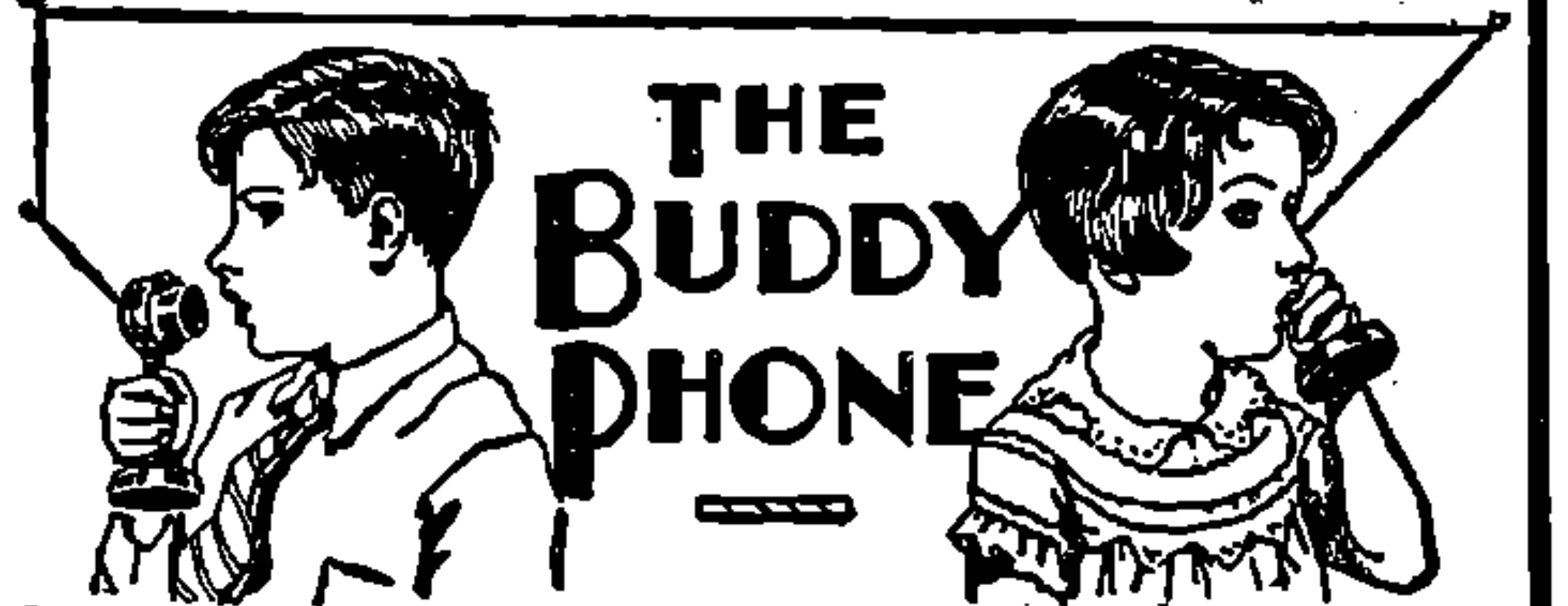

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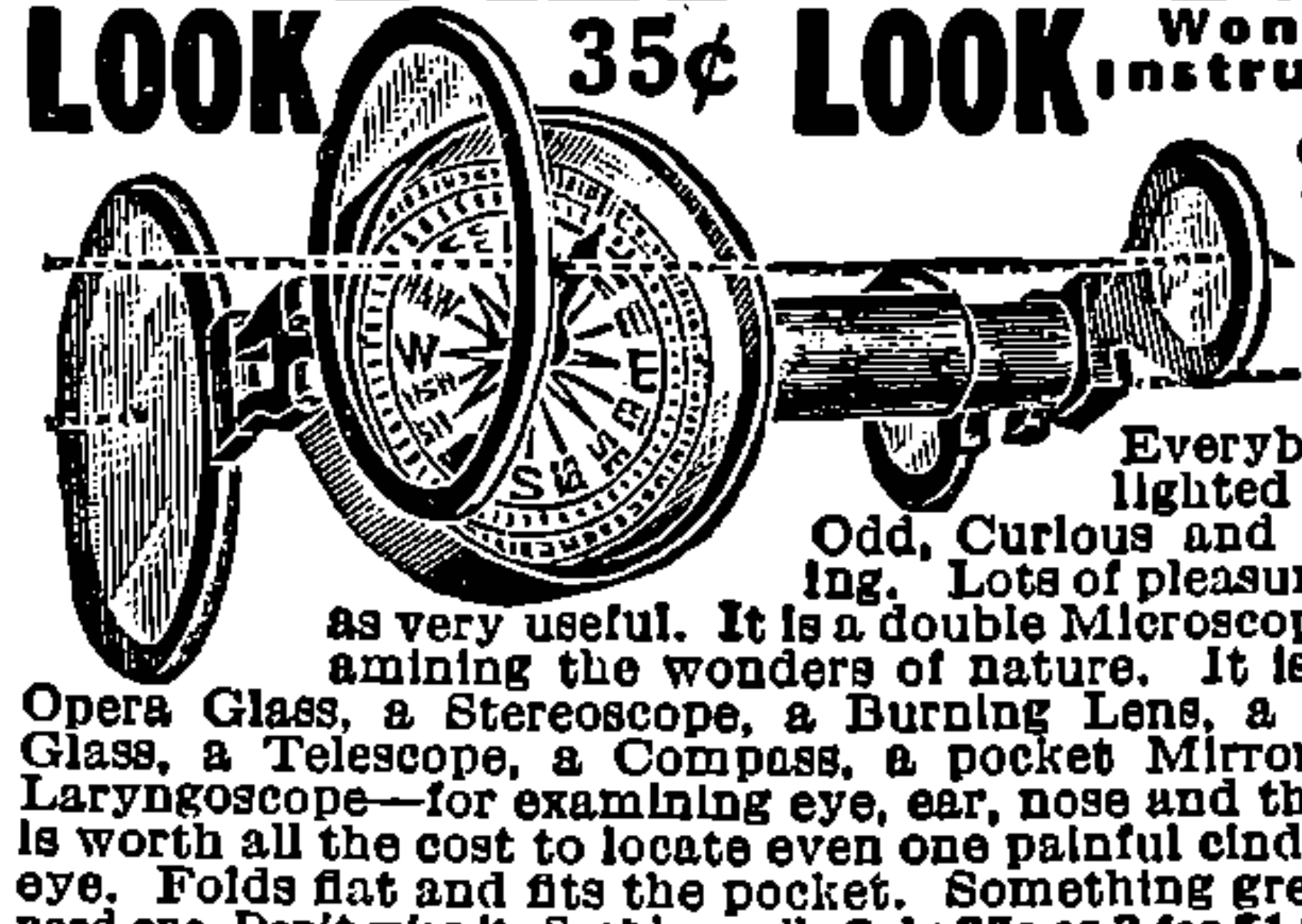

Greatest thing yet. Nine separate articles in one. Everybody delighted with it. Odd, Curious and interesting. Lots of pleasure as well as very useful. It is a double Microscope for examining the wonders of nature. It is also an Opera Glass, a Stereoscope, a Burning Lens, a Reading Glass, a Telescope, a Compass, a pocket Mirror, and a Laryngoscope—for examining eye, ear, nose and throat. It is worth all the cost to locate even one painful cinder in the eye. Folds flat and fits the pocket. Something great—you need one. Don't miss it. Sent by mail. **Only 35c or 3 for $1.00.**

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GREAT CURIOSITY Smallest Bible in the World. Size of a postage stamp. **200 Pages.** Said to bring good luck to the owner. A genuine work of art. Must be seen to be appreciated. Make good money selling them to friends, church acquaintances, etc. **PRICE 15c** each. **3 for 40c, 12 for $1.35, 100 for $7.50.** Also obtainable in Leather Binding, with gold edges. **Price 50c each, 3 for $1.25, $4.50 per doz.** Magnifying Glass for use with Midget Bible **15c**

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More fun than fighting with your wife. Look just like ordinary matches. As the victim tries to light one he gets quite a surprise.

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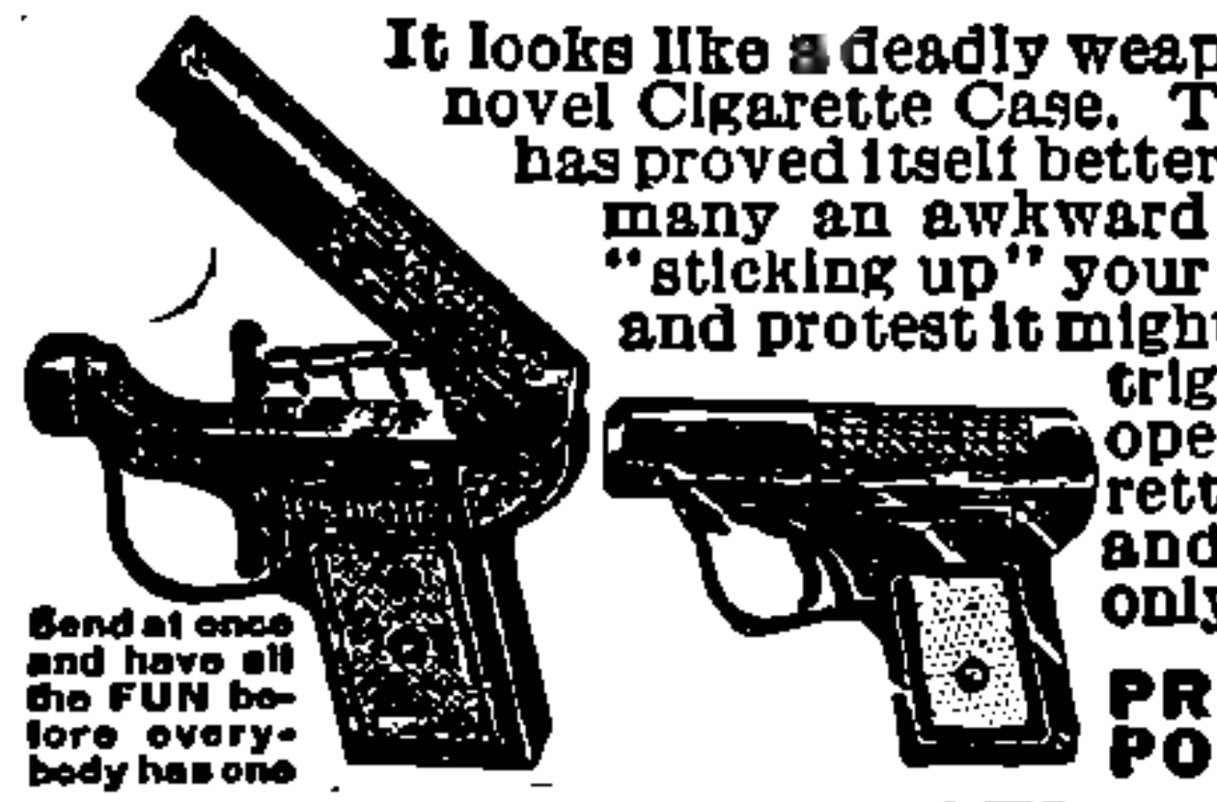

Send at once and have all the FUN before everybody has one

It looks like a deadly weapon, but it is merely a novel Cigarette Case. This clever contrivance has proved itself better than the real thing in many an awkward encounter. Great fun "sticking up" your friends. They squirm and protest it might be loaded. Pull the trigger and the slide flies open disclosing the cigarettes. Well made, light and compact. Weight only 2 ounces.

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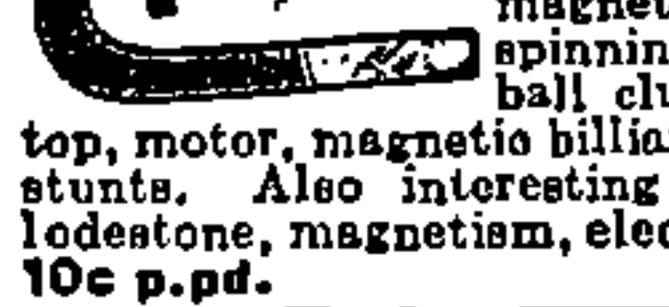

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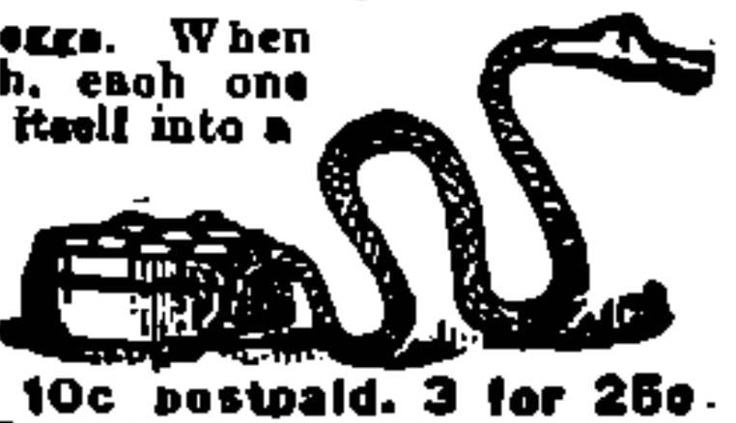

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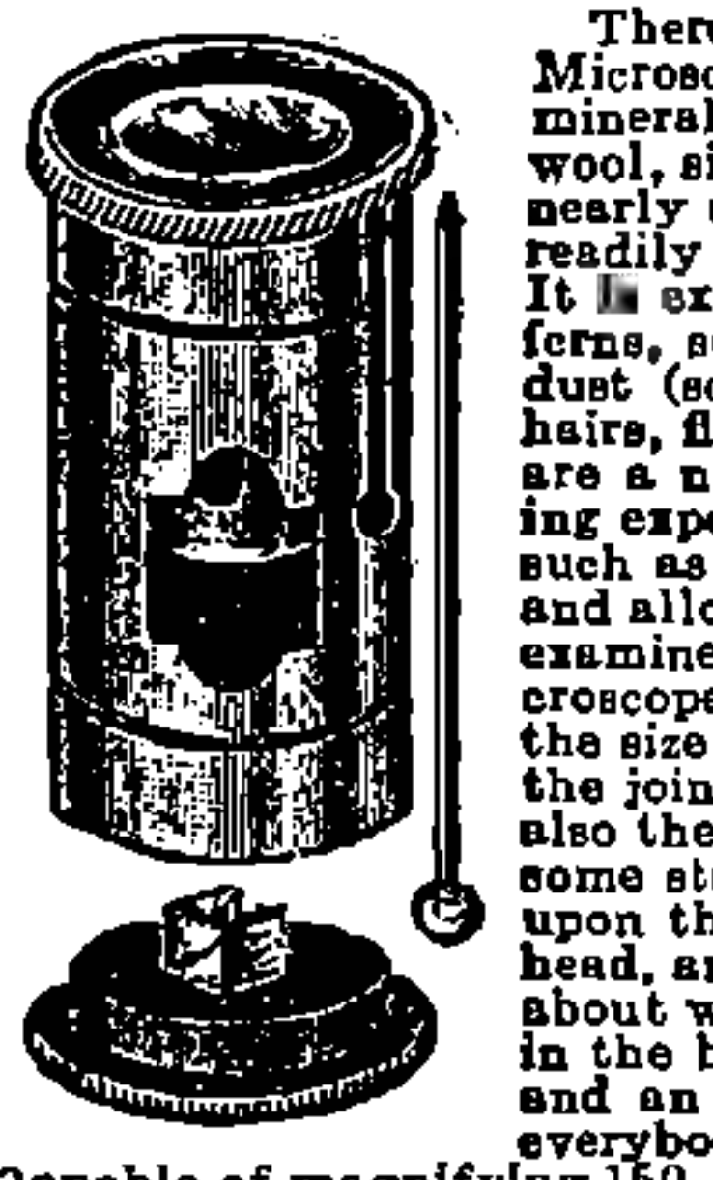
SURPRISINGLY GREAT MAGNIFYING POWER

EXAMINE GERMS IN WATER, CHEESE, SUGAR, ETC.



There are few things so interesting and valuable as a Microscope. It enables you to minutely examine mineral animal and vegetable specimens, to test cotton, wool, silk, seeds, water, flour, cheese, milk, and in fact nearly all articles of food. Unwholesome meat can be readily detected and ferments can be closely watched. It is exceedingly interesting to examine the spores of ferns, soda, sugar, salt, alum and other crystals, the dust (scales) from moth and butterfly wings, human hairs, flies and insects, while the animalculae in water are a never-failing source of wonder. Most interesting experiments can be performed with an instrument such as this. Place a small piece of cheese in a box and allow insects to feed on it for a day or two. Then examine a tiny portion of the cheese under the Microscope and you will see little animals, magnified to the size of large beetles; you can count their legs and the joints in them, the talons or claws upon each foot, also the hair or bristles upon their bodies. Or, obtain some stagnant water; deposit a small portion of scum upon the object glass of the Microscope with a pin's head, and you will see beautiful animalculae swimming about with as much freedom as though they were fish in the boundless ocean. It is a truly wonderful sight and an endless source of interest and enjoyment for everybody. The Microscope is made of brass and is capable of magnifying 160 areas and although small and compact, it will cover a very wide range of microscopic research. **Price only 59c Postpaid. JOHNSON SMITH & CO. Dept. 919 RACINE, WIS.**

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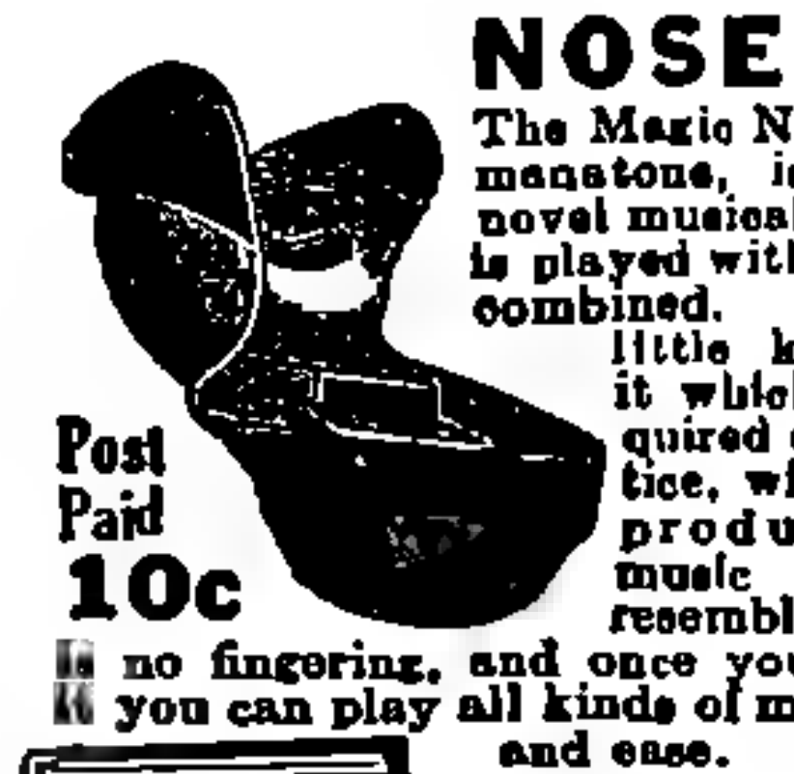

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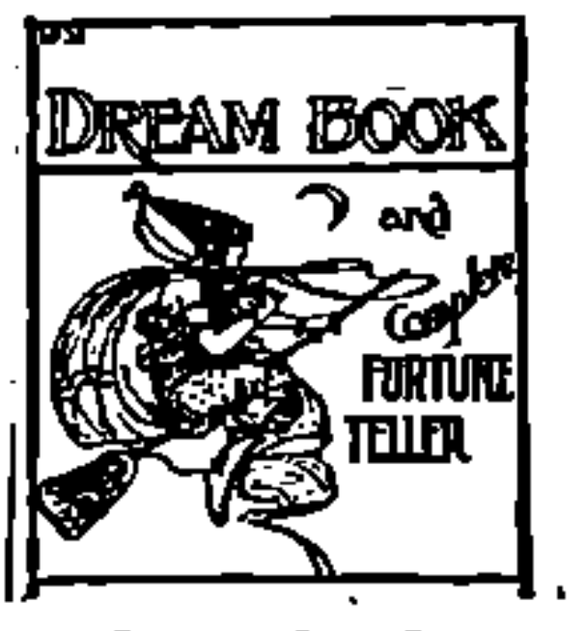

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FORTUNE TELLING BY CARDS

64-page book tells how. Gives the meaning of each and every card, how to deal and lay them out. Everything explained in simple language. **10c postpaid.**

Address orders for all goods on above and on following page to Johnson Smith & Co., Dept. 919, Racine, Wis.

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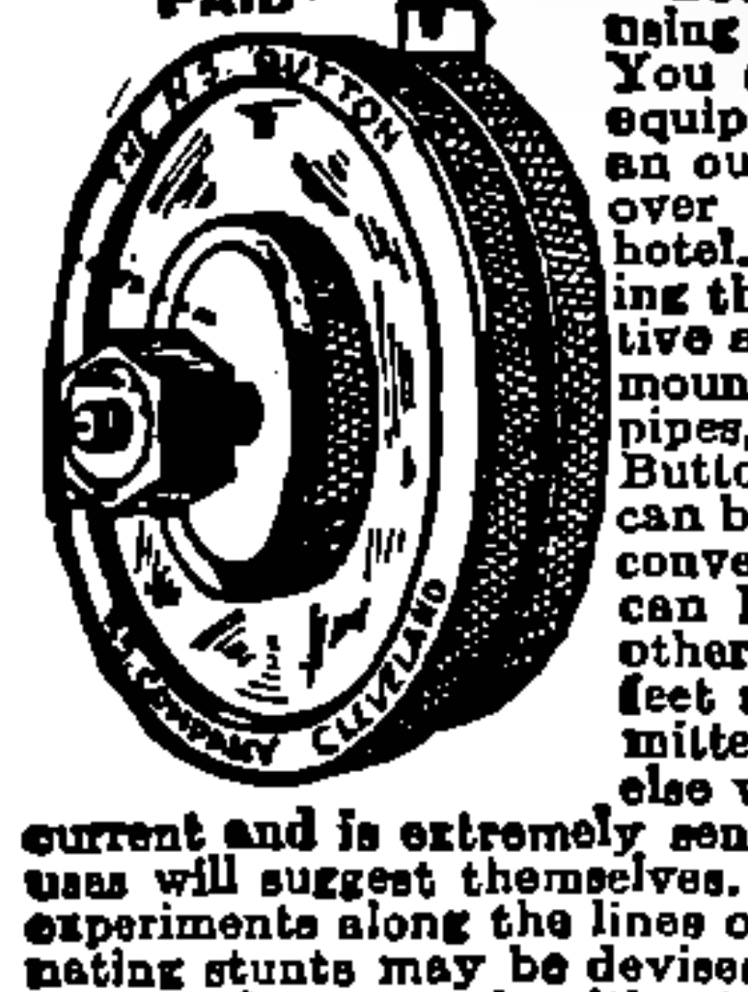
TALKING THROUGH CHESTY



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You can easily make a highly sensitive detectophone by using this Transmitter Button to collect the sound waves. You can build your own outfit without buying expensive equipment. It is simple and inexpensive. You can install an outfit in your home and hear conversations being held all over the house. You can connect up different rooms of a hotel. This outfit was used by secret service operatives during the war. It is being used on the stage. It is ultra-sensitive and is the greatest invention in micro-phones. You can mount the button almost anywhere—card board boxes, stove pipes, stiff calendars, on the wall behind a picture frame, etc. Button is so light and small it cannot be detected. Persons can be overheard without suspecting it. You can listen in on conversations in another room. A deaf person in the audience can hear the speaker. Connected to phonograph, piano or other musical instrument, music can be heard hundreds of feet away. Button may be used to renew telephone transmitters; often makes an old line "talk-up" when nothing else will. The ideal microphone for radio use; carries heavy current and is extremely sensitive. Amplifies radio signals. Countless other similar uses will suggest themselves. Experimenters find the Button useful for hundreds of experiments along the lines of telephones, amplifiers, loud speakers, etc. Many fascinating stunts may be devised, such as holding the button against the throat or chest to reproduce speech without sound waves. $5.00 is given to anyone who sends in a new suggestion for the use of the Button providing the manufacturers find it suitable for use in their literature. **PRICE $1.00 POSTPAID ANYWHERE.**

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THROW YOUR VOICE

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is a little instrument that fits in the mouth out of sight. Cannot be detected. It is used in connection with the above, and with the aid of this wonderful DOUBLE THROAT, or VENTRILO, you can imitate many kinds of birds, animals, etc. Remember you get everything for ONLY TEN CENTS—a booklet giving you full instructions how to become a ventriloquist and throw your voice, the **Double Throat**, or **Ventrilo**, and our big catalog of novelties, tricks, puzzles, masks, books, etc.

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22 SHORT BLANK

PRICES 50c $1.00

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MAGICIAN'S BOX OF TRICKS

Apparatus and Directions for a Number of Mysterious Tricks, Enough for an Entire Evening's Entertainment........... $1.00

☞ **ANYONE CAN DO THEM**

It is great fun mystifying your friends. Get this Conjurer's Cabinet, and you will be the cleverest fellow in your district. It contains the apparatus for ten first-class tricks, including The MAGIC BALL AND VASE TRICK (a wooden ball is placed inside, and upon replacing the lid has disappeared and is found in someone else's pocket); The HINDOO TRICK CARDS (can be made to change completely no less than five times); DISAPPEARING COIN BOX (a coin, placed in the wooden box, vanishes entirely or changes into a coin of another denomination); The GLASS GOBLET TRICK (a coin is dropped into a glass of water and when the water is poured out the coin has vanished and is found somewhere else); the RIBBON FACTORY FROM THE MOUTH TRICK (a seemingly endless supply of colored paper ribbons comes out of your mouth); the DISAPPEARING HANDKERCHIEF (a handkerchief held in the hand mysteriously vanishes); the WIZARD'S RING COIN TRICK; the ENCHANTED BOTTLE (no one but yourself is able to make it lay down); the GREAT HAT AND DICE TRICK (a large dice is placed on top of a hat, disappears, and is found underneath yet no one has touched the hat), and last, but not least, the GREAT PHANTOM CARD TRICK, or two from five leaves nothing. Full instructions are sent for performing each trick. In addition to the above, a number of other feats and illusions are fully explained for which you can easily make or procure the necessary apparatus. **Price complete $1.00 postpaid. JOHNSON SMITH & CO.**

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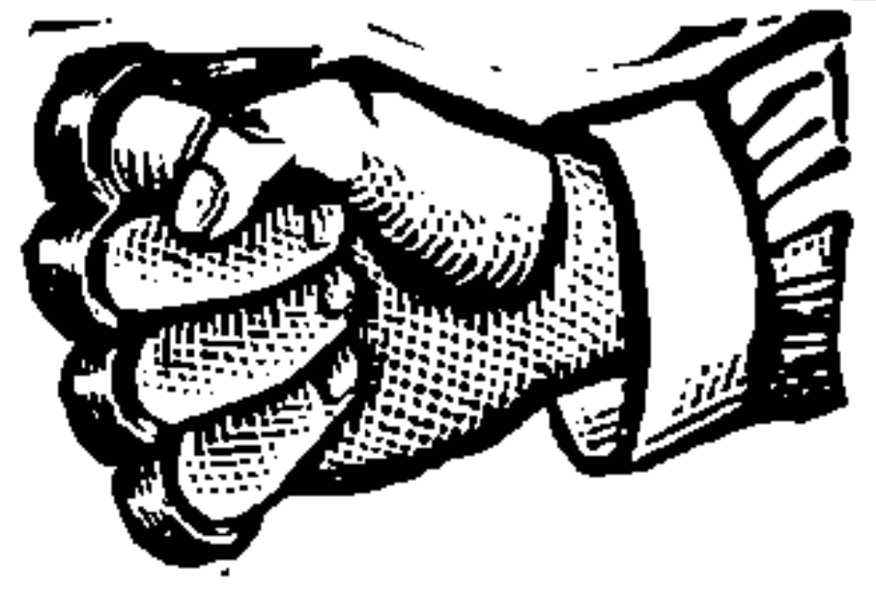

Used by police officers, detectives, sheriffs, night watchmen and others as a means of self-protection. Very effective. Easily fits the hand, the fingers being grasped in the four holes. Very useful in an emergency. Made of aluminum they are very light, weighing less than two ounces. Handy pocket size always ready for instant use. **Price 25c each, 2 for 45c postpaid.**

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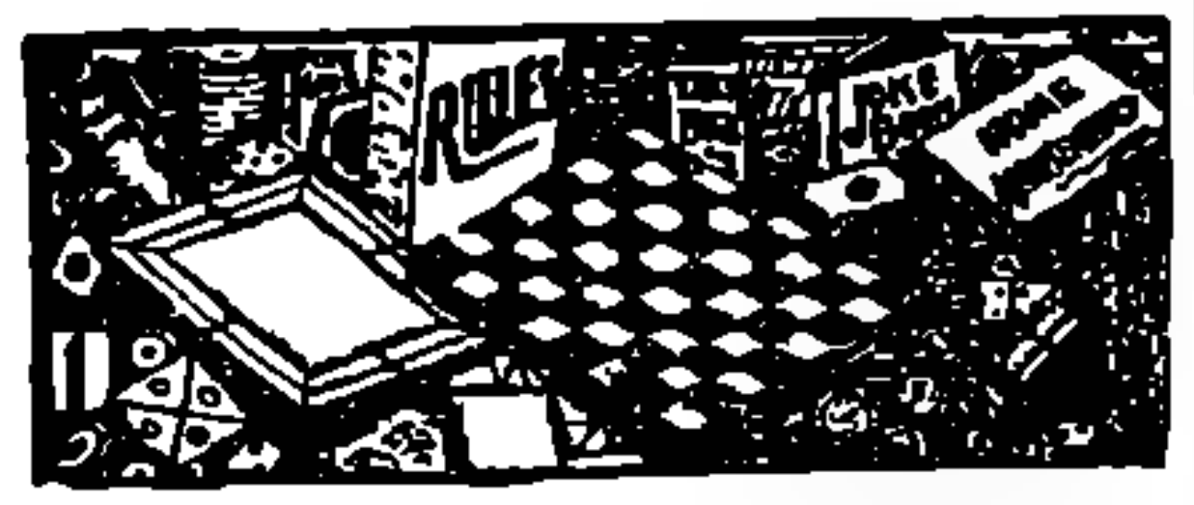

180 Jokes and Riddles, 21 Puzzles and Problems, Gypsy Fortune Teller, 50 Money Making Secrets, 36 Experiments in Magic, 58 Verses in Comic Poetry, 7 Parlor Games, 16 Card Tricks, 10 Funny Readings, 71 Toasts, Cut-outs for Checkers and Chess, Dominoes, Fox and Geese, 9 Men Morris, Anagrams, etc. All for **15c.** Postpaid.

MAKE YOUR OWN RADIO RECEIVER

Enjoy the concerts, baseball games, market reports, latest news, etc. This copyrighted book "EFFICIENT RADIO SETS" shows how to make and operate inexpensive Radio Sets, the materials for which can be purchased for a mere trifle. Also tells how to build a short-wave Receiver for bringing in foreign stations, police calls, ships at sea, etc. **ONLY 15c. postpaid.**

MAGIC MADE EASY

250 MAGIC TRICKS 10c

For Parlor or Stage

An excellent little book containing nearly 300 Tricks for parlor or stage. Tricks with cards, coins, handkerchiefs, eggs, rings, glasses, flowers, thimbles, spoons, bottles, string. Explains the mystery of the floating head and scores of other amazing feats of magic and illusions. Also Second Sight, Shadowgraphy, etc. So simple a child can perform them. Profusely illustrated. **ONLY 10c.**

125 CARD TRICKS and sleight of hand. Contains all the latest and best card tricks as performed by celebrated magicians, with exposure of card tricks used by professional gamblers. **Price 25c**

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Shoots B. B. Shots

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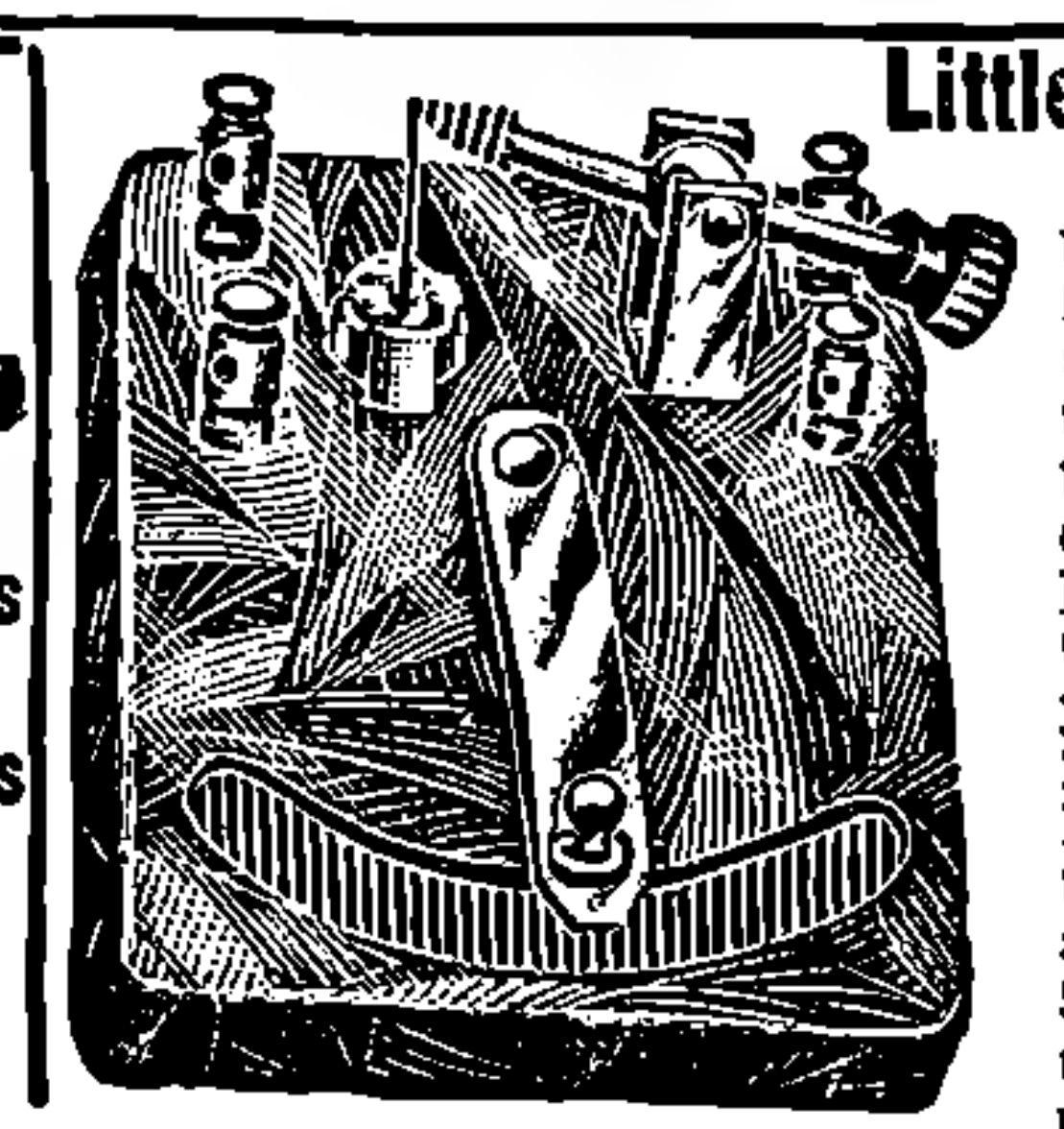


Little Wonder Crystal Radio Receiver $1

Say what you will about Electrical and Battery Sets, a CRYSTAL set has them all beat for simplicity and clearness of tone. There is absolutely no noise and no distortion—no batteries to buy—no tubes to wear out—no maintenance expense whatsoever. Cost nothing to operate and will last indefinitely. Reception is loud and clear. This Receiver is guaranteed to work equal to the most expensive Crystal Set you can buy. Has a receiving radius of over 25 miles, or under favorable conditions up to 100 miles. Constructed of the finest materials throughout, including supersensitive crystal, assuring quick results. PRICE of Receiver only **$1.00 postpaid.** Or complete with Ear Phone and Aerial Kit—everything all complete—nothing more to buy, **$2.95 postpaid.**

Send remittance (Postage Stamps accepted) for all articles listed above, also in our other ad on previous page

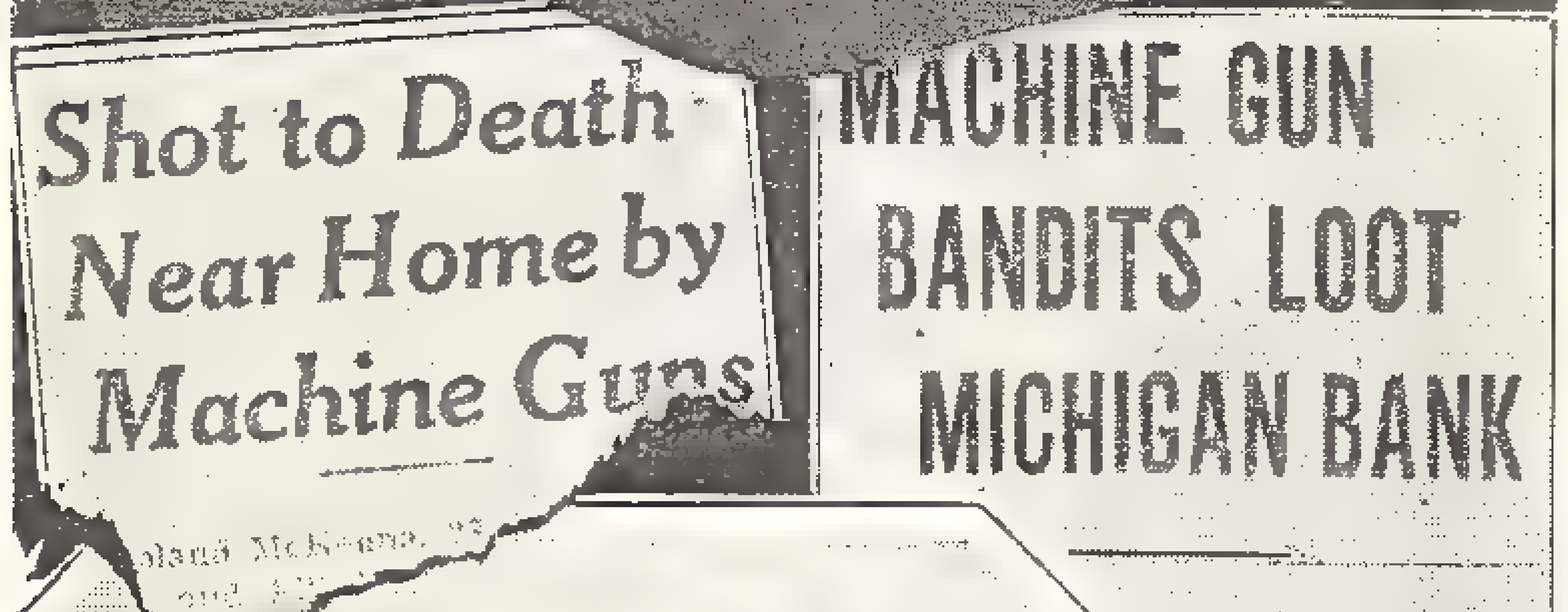
JOHNSON SMITH & CO. Dept. 919 Racine, Wis.

Amazing Secret TRAFFIC *in* Gang DEATH MACHINES

Machine Gunners Ambush, Kill Kidnaper in Chicago

Gangsters Wait Month, Shoot Victim Down as Family Waves

Headlines appearing with startling frequency in the daily papers attest to the efficacy of the submachine gun in gang battles. Photo shows how the Thompson sub-machine gun is held for firing from shoulder.



Shot to Death Near Home by Machine Guns

MACHINE GUN BANDITS LOOT MICHIGAN BANK

If you are an honest, law-abiding citizen, you can't buy a sub-machine gun—but if you're a gangster you'll have no trouble. The author tells here how the underworld carries on an amazing secret traffic in machine guns and other deadly weapons.

Here are two Chicago detectives examining arsenal of gangster's lair. The army type machine gun in the foreground was the principal weapon in the assassination of a couple of rival gangsters who were put "on the spot." Pump gun also makes effective artillery for close-up firing.

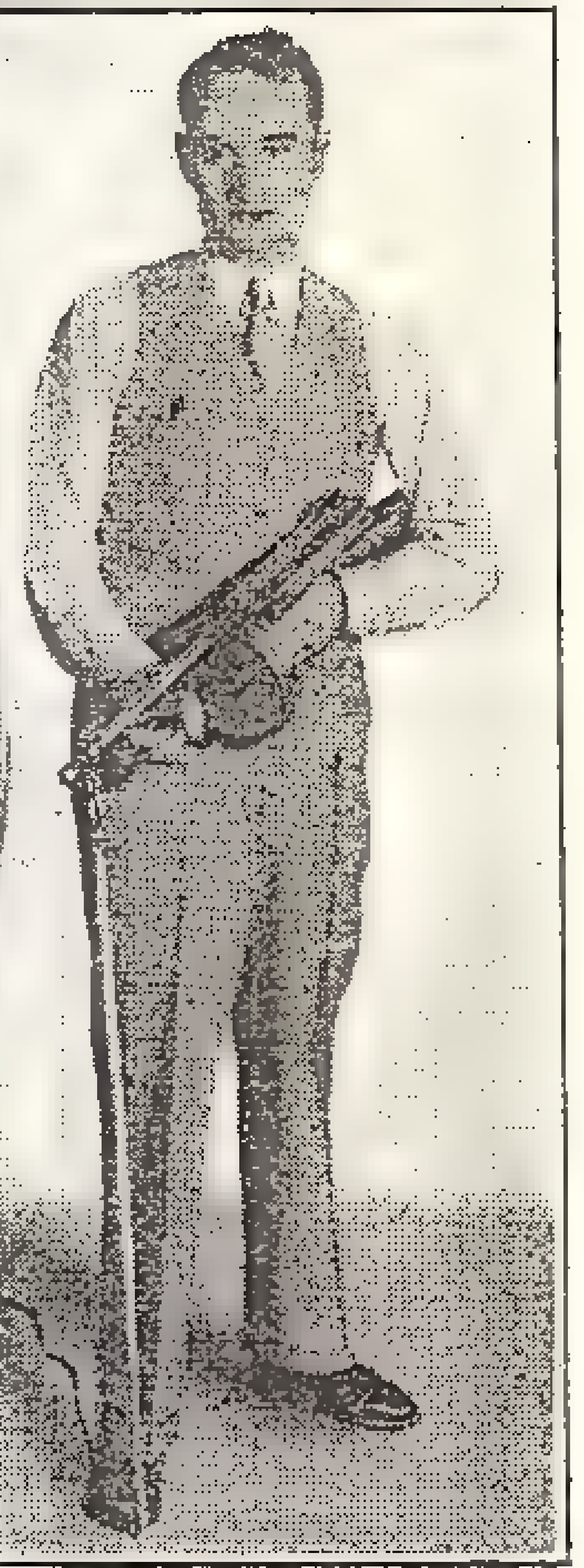
by STERLING GLEASON

FOUR men walked down a busy city street. Except that their right arms hung rather stiffly at their sides, their appearance would have attracted no attention anywhere.

Yet each man was literally a walking arsenal. Under each well-tailored coat, a Thompson sub-machine gun nestled snugly against the bearer's armpit. The muzzle, only slightly protruding beneath his coat, was concealed in the palm of his hand.

Close behind them walked two others—musicians, apparently. But the innocent-looking violin cases they carried held more machine guns. Each carried a round black drum loaded with 100 45-calibre bullets. In an instant these six men could have transformed themselves into a formidable machine gun squad of terrible power.

Above—All policemen of New York are put through a course of instruction on the handling of the sub-machine gun. Instructor at left is demonstrating the swordcane, a weapon used in France about a hundred years ago. Insert at right shows the hundred-round drum which feeds bullets to submachine gun at the rate of 400 to 800 a minute. Drums may be quickly slipped into position for gang assassination.



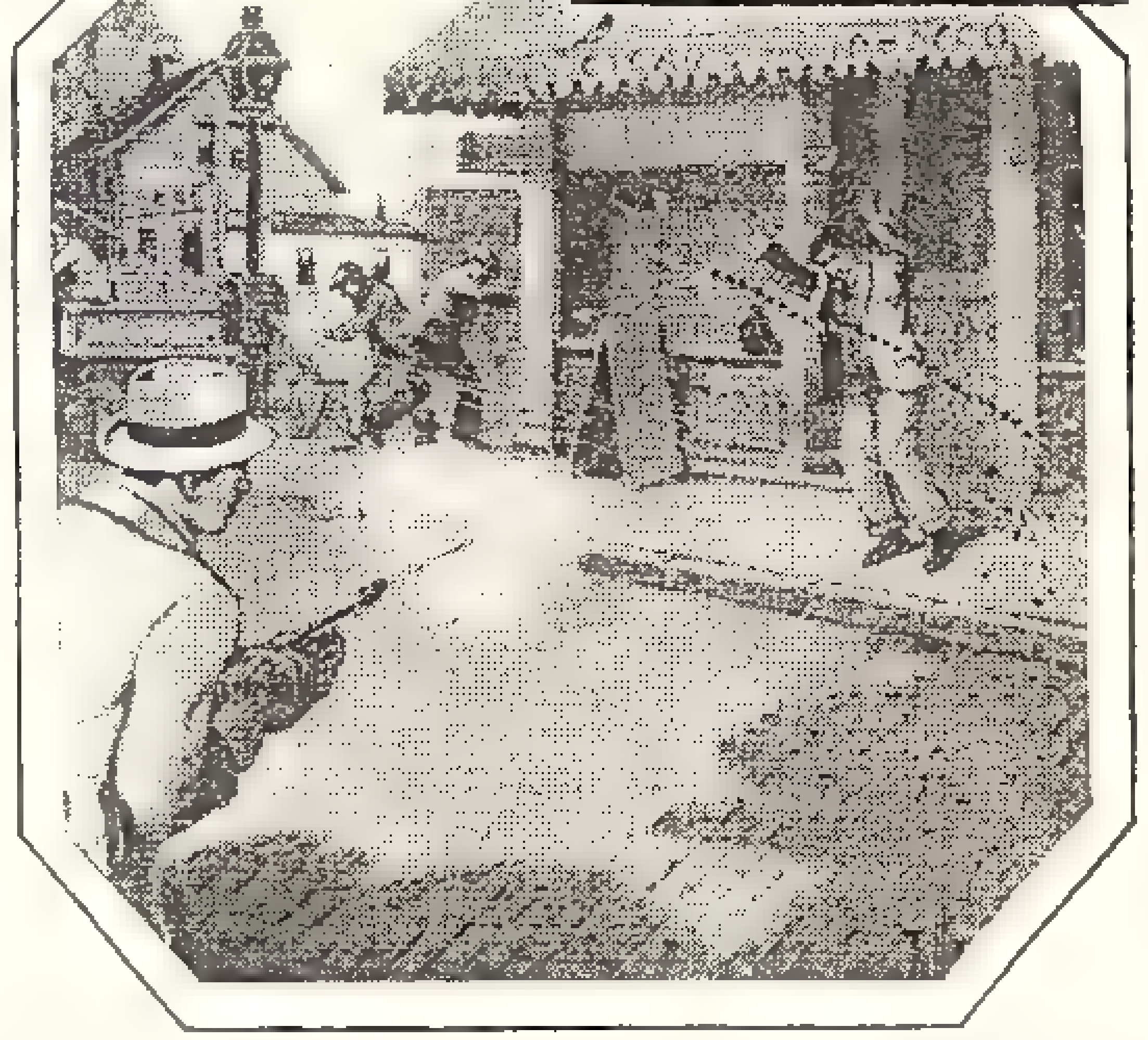
At right is seen foot strap which holds barrel steady in short bursts of firing.

Such a miniature army might today enter your own town and open a reign of terror. An amazing secret traffic in machine guns has armed organized crime in military fashion.

With revolvers and pistols for light arms, machine guns for artillery, armored automobiles for tanks, and tear gas for poison barrage, criminal mobs become more formidable than an army. All this is made possible by underworld channels which distribute the weapons for the sake of an enormous profit.

How do gangsters obtain these terrific instruments of death? Where are they manufactured? How are they distributed and sold? Recently the writer undertook to learn these facts. He found the amazing truth to be that machine guns can be bought like so many sacks of potatoes—if you are known in criminal circles and have the money. An honest citizen might find it difficult to get one—but not a known gangster!

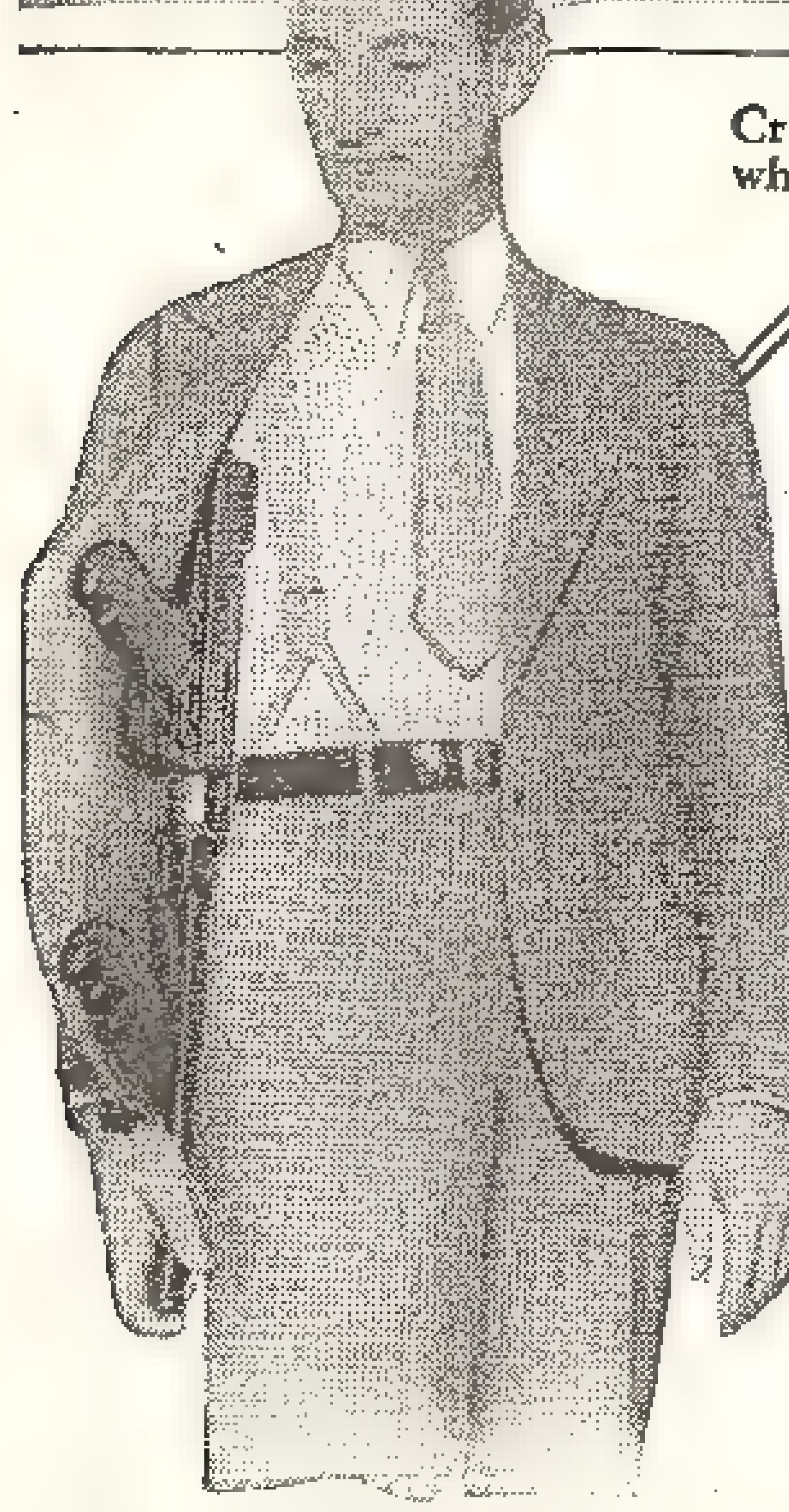
Here is an example of how the system works. A number of sub-machine guns, ordered in the name of the police department of a large city, were diverted by an

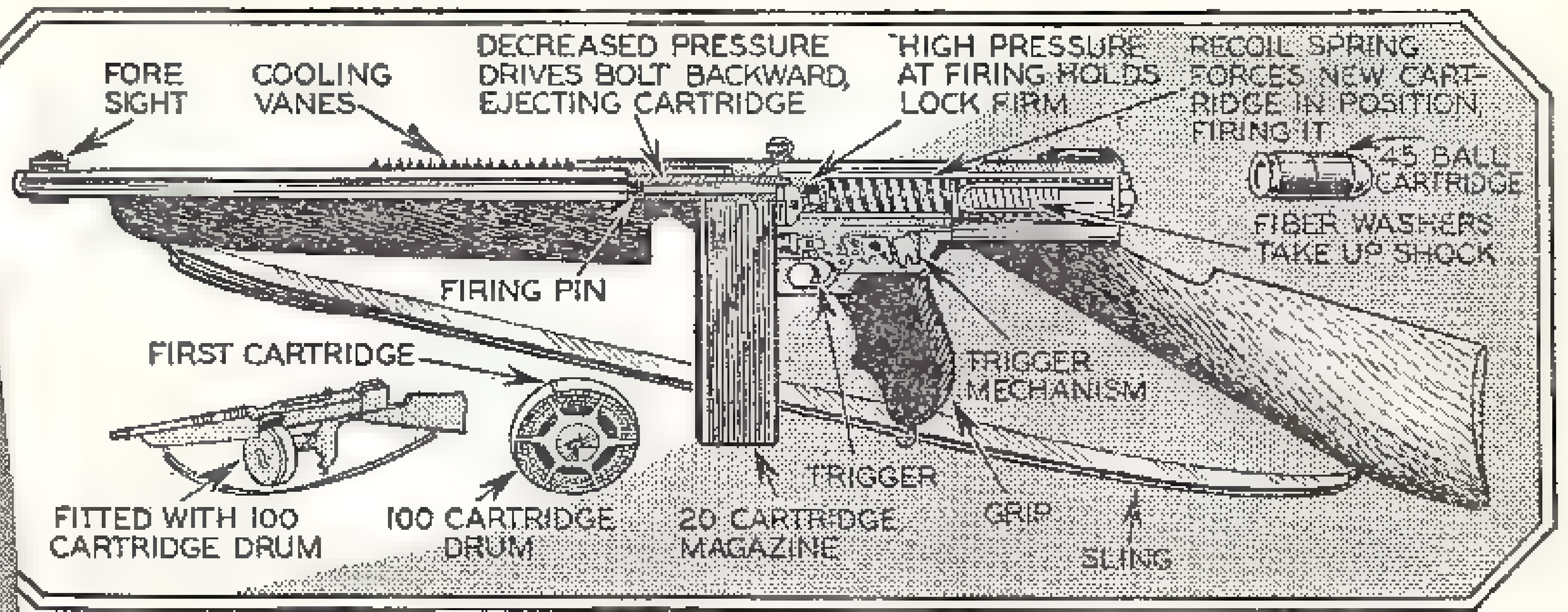


Careful aiming is unnecessary with the submachine gun. Spitting 100 rounds in 15 seconds, the gun needs only to be pointed in the general direction of the victim. The recoil causes the bullets to cut a pattern of holes curving upward.

Pull on Trigger of Submachine Gun Sprays 100 Bullets in Fifteen Seconds

Crudely made but deadly, this "gas pipe bomb" was intended for home of a Chicago gangster who was muscling in on a rival's territory. Police officer is explaining its construction.




FORE SIGHT
COOLING VANES
DECREASED PRESSURE DRIVES BOLT BACKWARD, EJECTING CARTRIDGE
HIGH PRESSURE AT FIRING HOLDS LOCK FIRM
RECOIL SPRING FORCES NEW CARTRIDGE IN POSITION, FIRING IT
.45 BALL CARTRIDGE
FIBER WASHERS TAKE UP SHOCK
FIRING PIN
FIRST CARTRIDGE
TRIGGER MECHANISM
TRIGGER
GRIP
SLING
FITTED WITH 100 CARTRIDGE DRUM
100 CARTRIDGE DRUM
20 CARTRIDGE MAGAZINE

One of the chief advantages to gangsters of the Thompson submachine gun is that it can be concealed beneath the coat, as illustrated at the left. Drawing above shows the construction of the deadly submachine gun. Operated by recoil of the shots, the gun literally sprays a victim with bullets coming out almost end to end. Cartridges of .45 caliber, almost a half inch in diameter, kill instantly.

unscrupulous official to a firearms company in which he had a financial interest. When detectives checked up, the dealer said that all records had been lost, and that he could tell them nothing. Police did not doubt that the guns had passed into the hands of criminals, but lack of legal proof tied their hands.

This episode was followed by a series of robberies in which machine guns were used. Soon afterwards, a carload of racketeers overtook an armored truck, opened a withering stream of machine gun bullets on the wheels, cut them out, and overturned the truck. When the crew foolishly came out to give battle, they were shot down and a large payroll stolen.

Modern machine guns are of two types—the machine gun, and the sub-machine gun. The machine gun, proper, is a large weapon, weighing, complete, several hundred pounds and requiring a tripod mounting. Its ammunition is generally of .30 calibre, although .45 and .50-calibre guns are in use by the Army. The bullets are fired from belts or drums.

The sub-machine gun is smaller, lighter, and requires no mounting. It is the principal weapon of the racketeer.

Rapid-fire guns today are operated by the recoil of the barrel or the back-pressure of the powder gas. The Vickers, Browning, Maxim, and the Thompson sub-machine gun, are recoil-operated; the Browning auto-rifle, Hotchkiss, and Lewis machine guns are operated by gas pressure.

Because of its large size and weight, the ordinary machine gun is used almost exclusively by military authorities. Gangsters prefer the Thompson sub-machine gun. If you study this weapon, you will realize what a terrifying thing it is, and understand its power. Short, stocky, light enough for one man to carry and use, it is in reality an automatic rifle which will pour out bullets at the terrific rate of 400 to 800 per minute—spitting them forth so fast that they are almost end to end.

Drucci, Chicago Gang Killer, Used Submachine Gun, Sawed Off Shotgun

The ammunition is .45-calibre—giving the gun greater "stopping power" than any other ordinary machine gun or rifle. The impact of these heavy slugs will inflict a terrible shock that stops the strongest man immediately.

Traveling at from 850 to 900 feet per second, the .45 bullet carries a muzzle-energy of 430 foot-pounds. At 300-foot range, it will penetrate white pine to a depth of 5½ inches. Not only the force its bullets deliver upon impact, but its rapidity of fire, makes the gun so deadly.

A 100-round drum may be fired in less than fifteen seconds. Pump 100 lugs of lead, weighing more than three pounds all together, into the delicate parts of the human body, and you will put any man out of commission.

Accuracy of aim is not a strong point of the sub-machine gun. "It doesn't need to be accurate," one detective told me. "This gun puts out the bullets so fast they almost run over one another. You don't put the gun to your shoulder and aim it, like a rifle. You just hold it at your side, point it in a general direction, and spray the mark with bullets. It's just like using a garden hose. The recoil lifts the muzzle and kicks it to the left, so that the gun cuts a pattern of bullet holes that curves diagonally upward. Nothing could live in that line of fire."

Although a tremendous power in the hands of the gangster, the machine gun is useful to police chiefly as a threat. Ruthless gangsters have no objection to turning a machine gun loose on the street, shooting down women and children without compunction. Such an occurrence has taken place in New York City three times within the past six months.

Policemen, however, will not fire into a crowd. Tear-gas is more effective and does not permanently injure. Only when a desperate criminal is barricaded in a house, for example, can the machine gun be used freely by police.

"I have frequently used the sub-machine gun for personal protection," said one detective lieutenant whose work brings him into constant contact with gangsters. "For this purpose, a Thompson gun, plus a tear-gas 'fountain pen,' is ideal.

"Recently I had to bring in a big beer baron who had just come to town and was wanted by police. A known killer, he was always accompanied by a heavily-armed bodyguard.

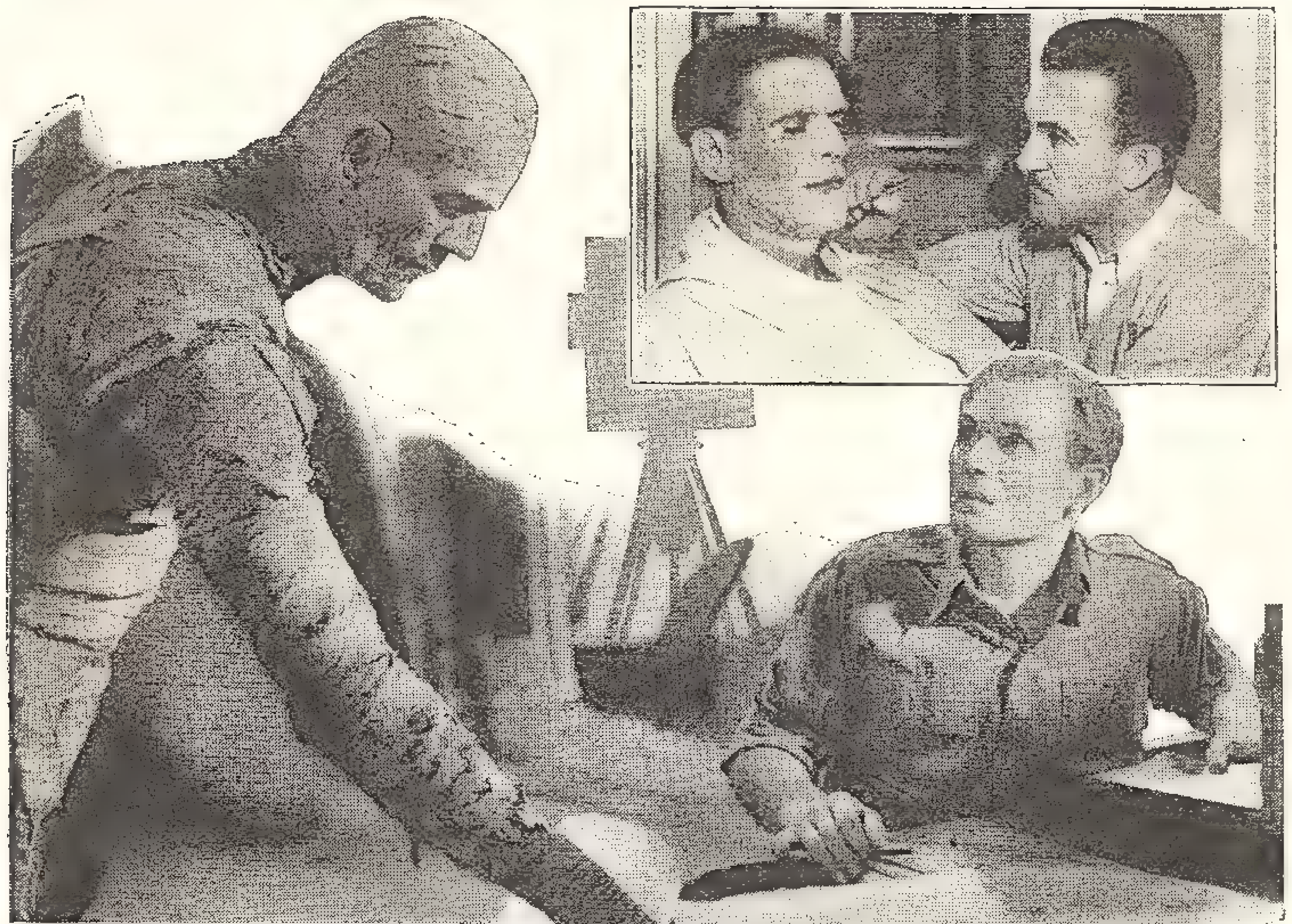
"When I called at his hotel room, I carried the 'typewriter' in my hands. Aiming it straight ahead of me, I kicked the door open. When the beer baron and his bodyguards saw the ugly muzzle of the 'chopper,' they raised their hands skyward in a hurry. No man cares to argue with one of these babies."

Police instructors are here seen showing policemen how a gunman conceals his weapons and how to perform the frisking act. This dummy is wearing a bullet proof vest.

Right—Some of the weapons found in the arsenal of Schemer Drucci, Chicago gangster, famous for his ability as an executioner. The submachine gun and the sawed-off shotgun were his favorite weapons. Left—The .30 and .45 caliber bullets.

MAKEUP SECRETS of Movie HORROR Pictures

When you shudder at the sight of frightful characters in horror movies, it is usually the makeup man who is responsible for your thrills. Read here how he creates actors that terrify you.



This terrifying scene from "Im-ho-tep" shows Karloff as he appears in his mummy makeup—an exact duplicate of real mummies found in ancient tombs. In photo at top Pierce is seen applying the first layer of makeup—cotton and spirit gum—to Karloff's face.

In transforming Karloff into a mummy, Pierce encountered greatest difficulty in making up the hair. On top of a layer of liquid grease paint, which acted as a base, was patted a mixture of beauty clay and fullers' earth, which was then dried.

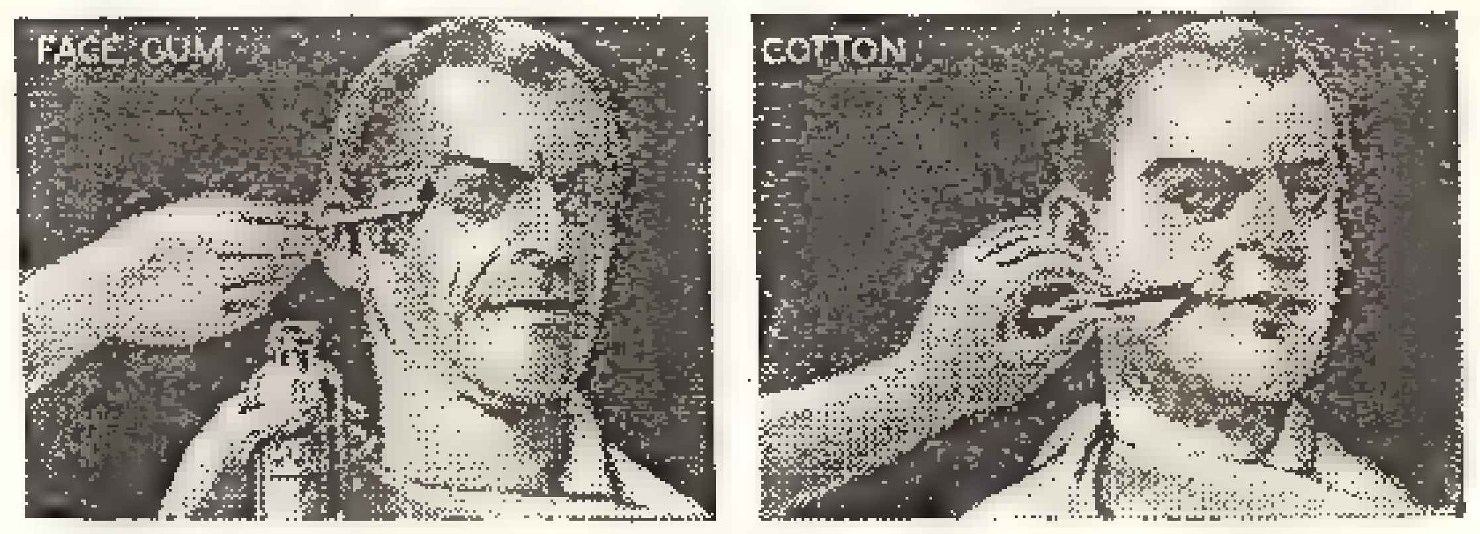
by JAMES BOWLES

FROM the depths of an ancient casket a bony and shriveled hand stretched back across history thirty-seven centuries to snatch a scroll from a terror-stricken actress.

Deep, gray lines of age streaked the hand. Dust fell from ancient fingers. Yet it moved, actually grasped the parchment, and disappeared from the screen.

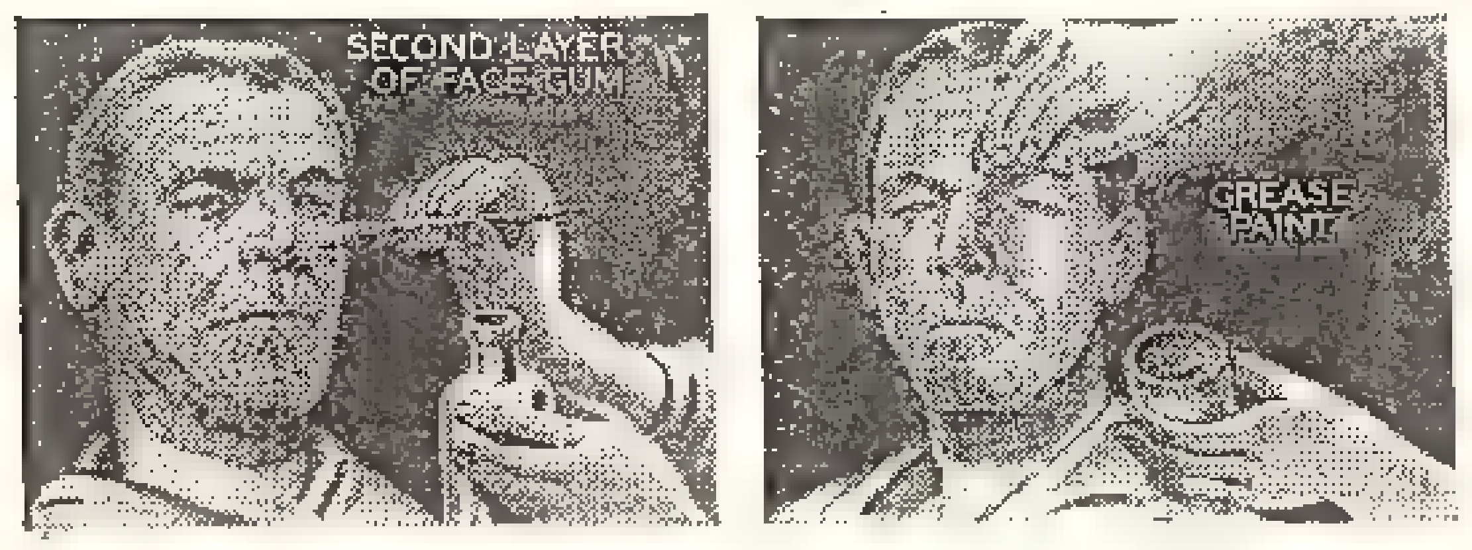
Outside the camera angle sat Boris Karloff. It was his hand whose antiquity the camera revealed, a hand "mummified" earlier in the morning by Jack Pierce, movie make-up expert, who recently produced a living mummy in the person of Karloff, complete in 1500 feet of rotted cloth bandages, wrinkled skin, closed eyes and the yellow hair of a person dead many centuries.

The "mummy" represented the latest achievement of the movie make-up artists, who strive constantly for new and novel means of bringing striking figures—living and dead—to the screen. On three different occasions Pierce turned Karloff into either a part or a whole mummy, counterpart of the first mummy ever created.



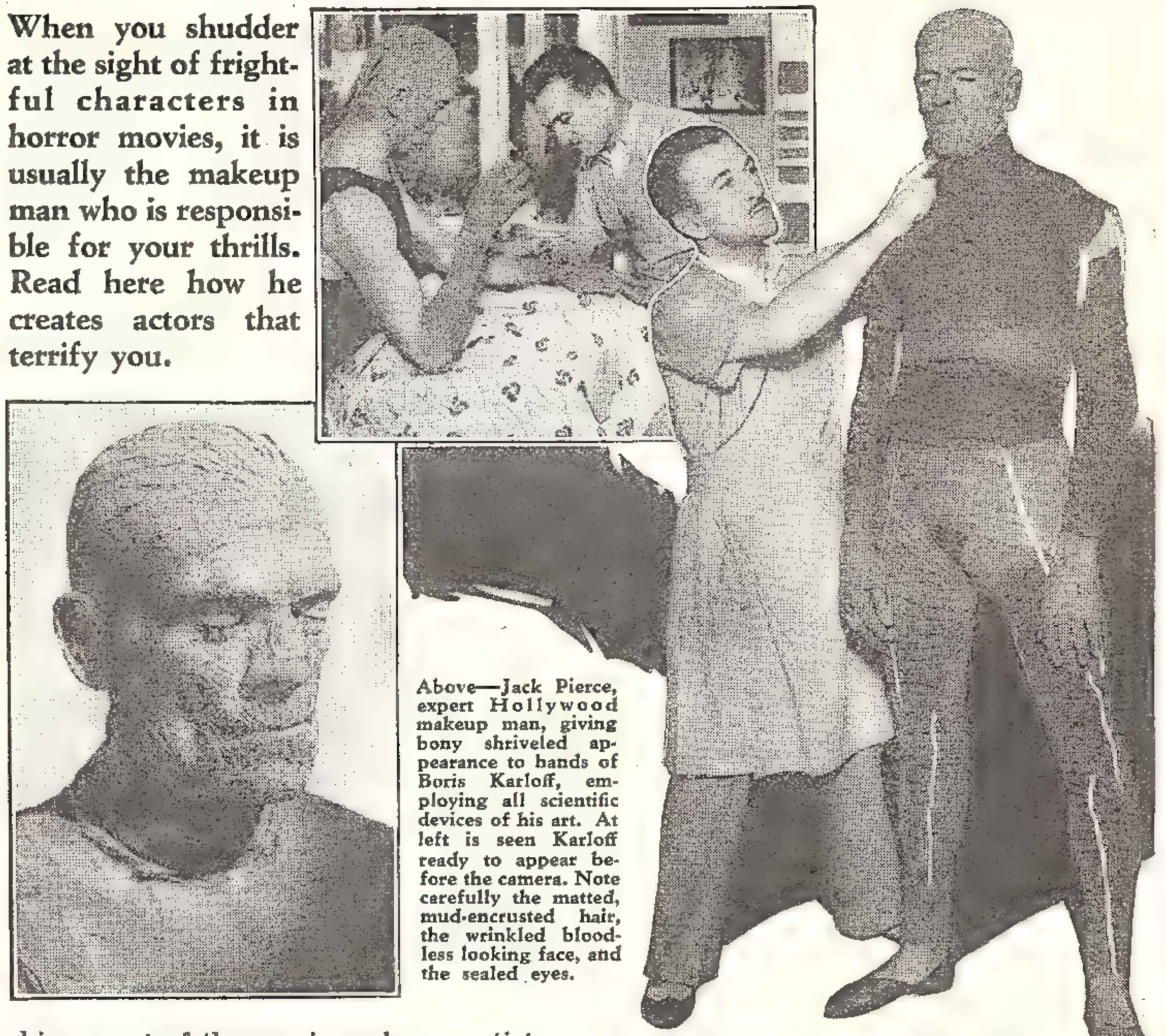
First step in "mummifying" face was application of special gum; second, plastering skin with layer of glue and cotton.

Few persons realize that mummy-making combined science and art among the Egyptians. Pierce searched thirty-five volumes of Egyptian history in his quest for authentic background for this bit of make-believe. "Who," he asked himself, "was the first man mummified, what was used, how was he wrapped?"



SECOND LAYER OF FACE GUM
GREASE PAINT

Third step: Second layer of gum is brushed on cotton to preserve wrinkles. Fourth: Grease paint applied to cheeks brings out high lights before the movie camera.



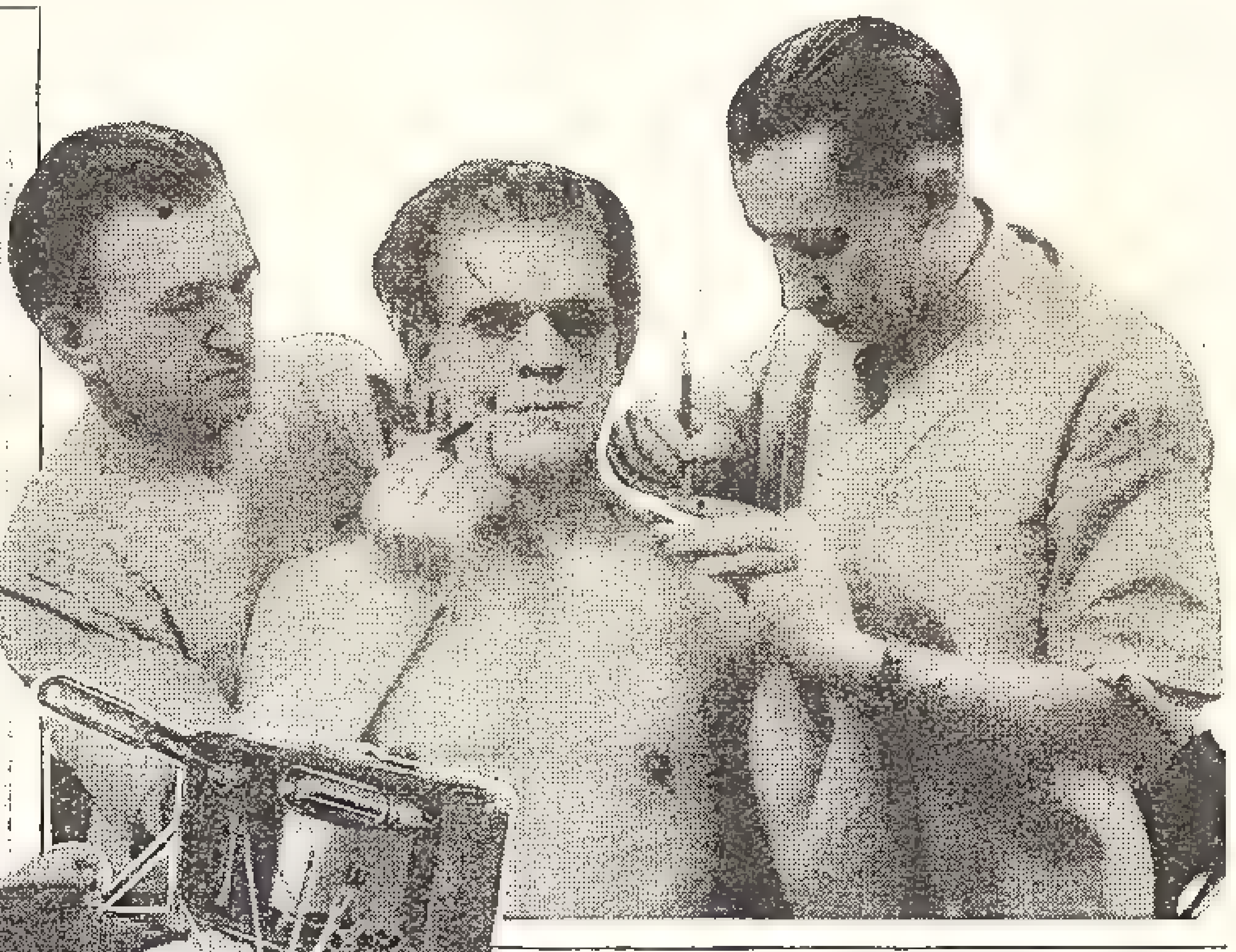
Above—Jack Pierce, expert Hollywood makeup man, giving bony shriveled appearance to hands of Boris Karloff, employing all scientific devices of his art. At left is seen Karloff ready to appear before the camera. Note carefully the matted, mud-encrusted hair, the wrinkled bloodless looking face, and the sealed eyes.

To provide last word in realism, Karloff, for his appearance in the movie story of Egyptian reincarnation, was wrapped in shroud of charred cheese cloth, which was later brushed over with caked mud. In the filming the mud crumbled off when mummy rose from its ancient coffin, coming to life after some 3700 years.

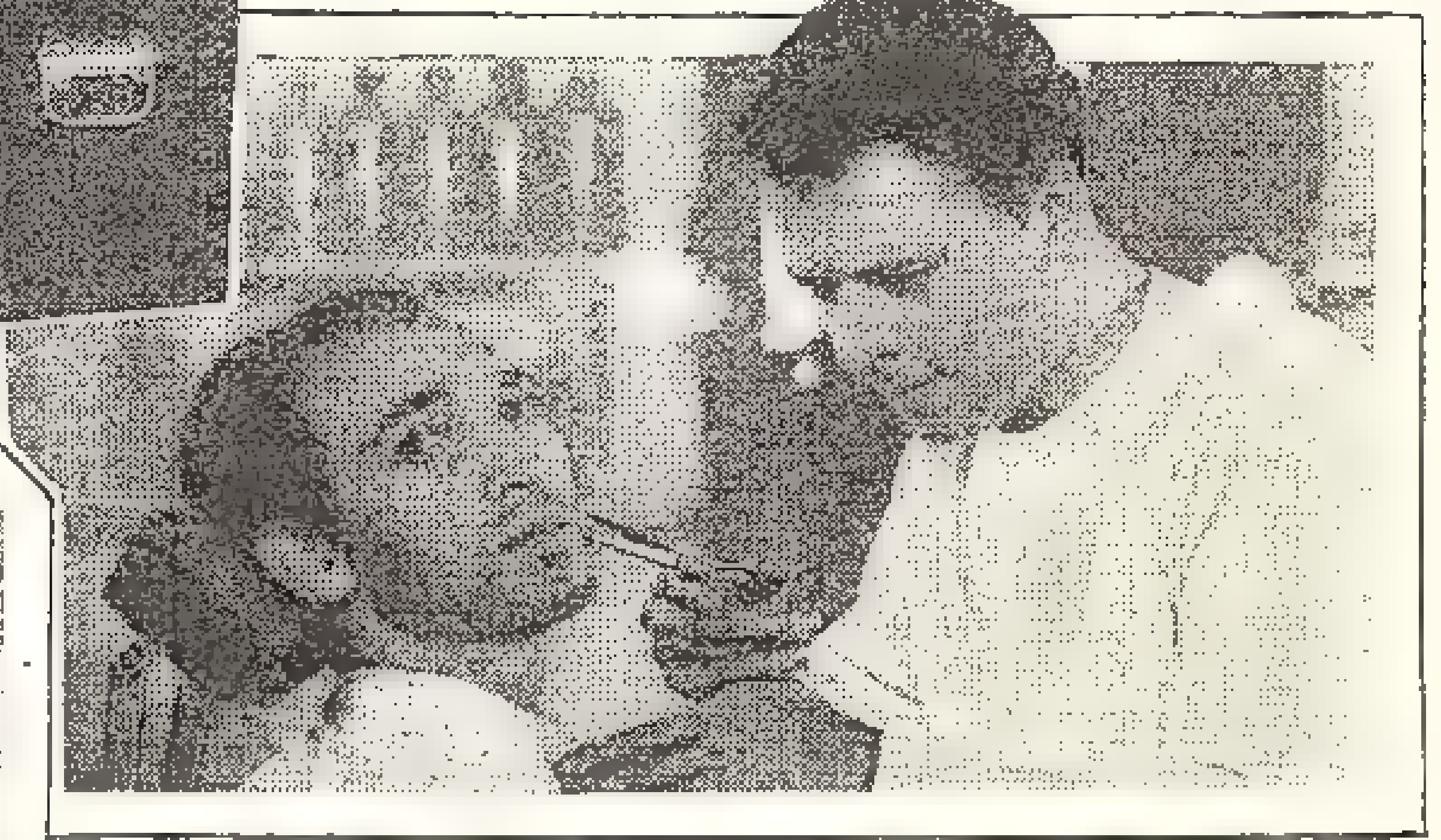
All the information he could dig up gave only a suggestion, not a solution of Pierce's problem in turning Karloff into a duplicate of Osiris for "Im-ho-tep," in which picture the mummy comes to life. Manifestly embalming fluids and perfumes have no place in makeup for the camera, so for a month Pierce experimented with pigments, paints, drying materials. He had to have a rotted cloth that would not fall from the body, yet would crumble easily when the body stirred from its coffin. The face must look very old and withered and dry. The eyes must be closed, yet seem to see.

An assistant spent a week feeding double-weight cheese cloth in two widths—two and three inches—through a barrel-like cylinder over a gas flame, winding it gently over a turning wheel. This cooked and

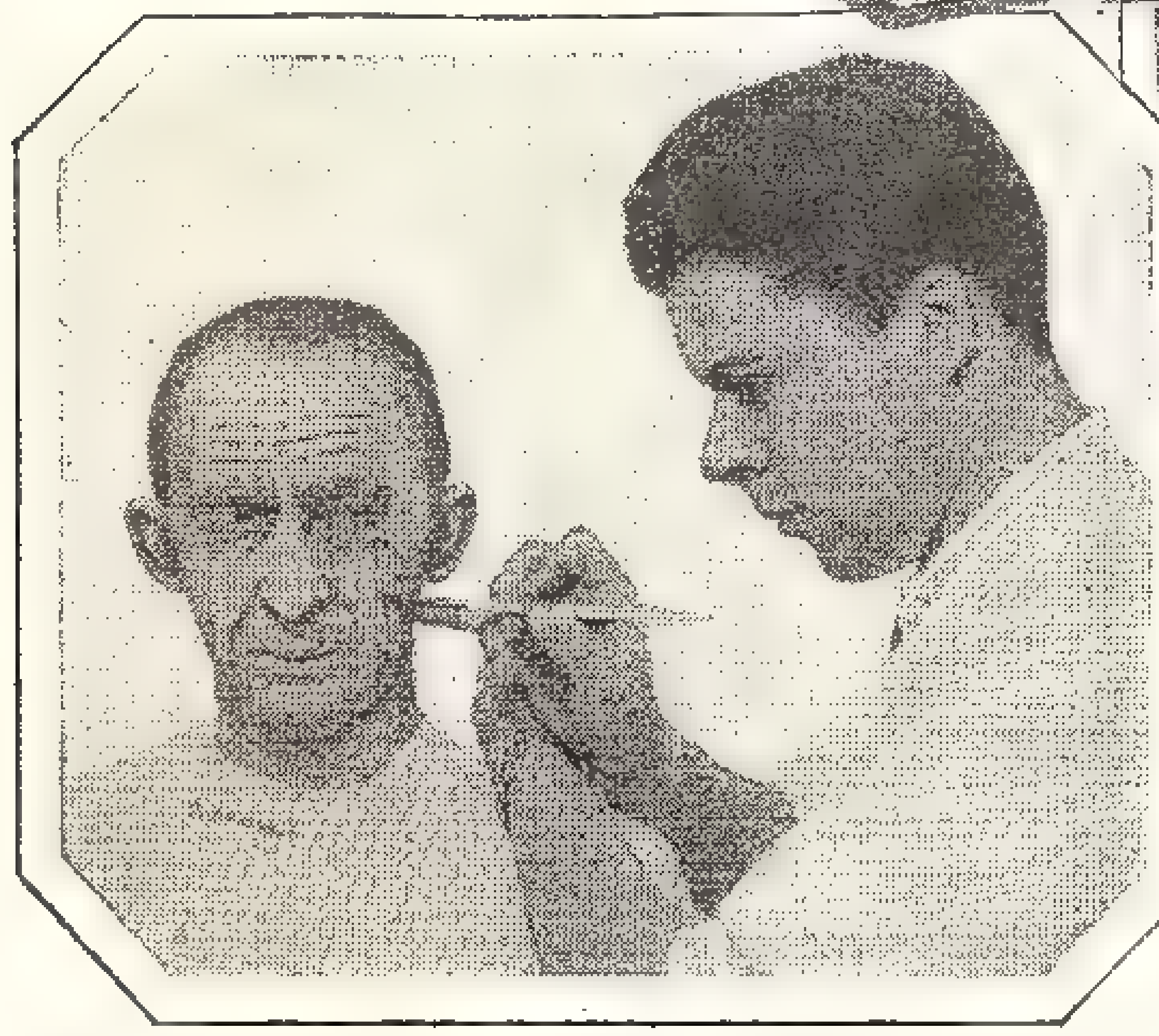
Makeup man at work combing out wig on special "gin." Silk milling gauze makes hair.



You remember that thriller "Frankenstein." Here Pierce is at work making a monster out of Karloff.



Here's an unusually delicate job for the makeup man—"growing" a beard, hair by hair, on Erny Westmore.



When characters in a movie are seen to grow old in the story, the makeup man is the one who applies the aging process. Here makeup expert is painting on lines of age.

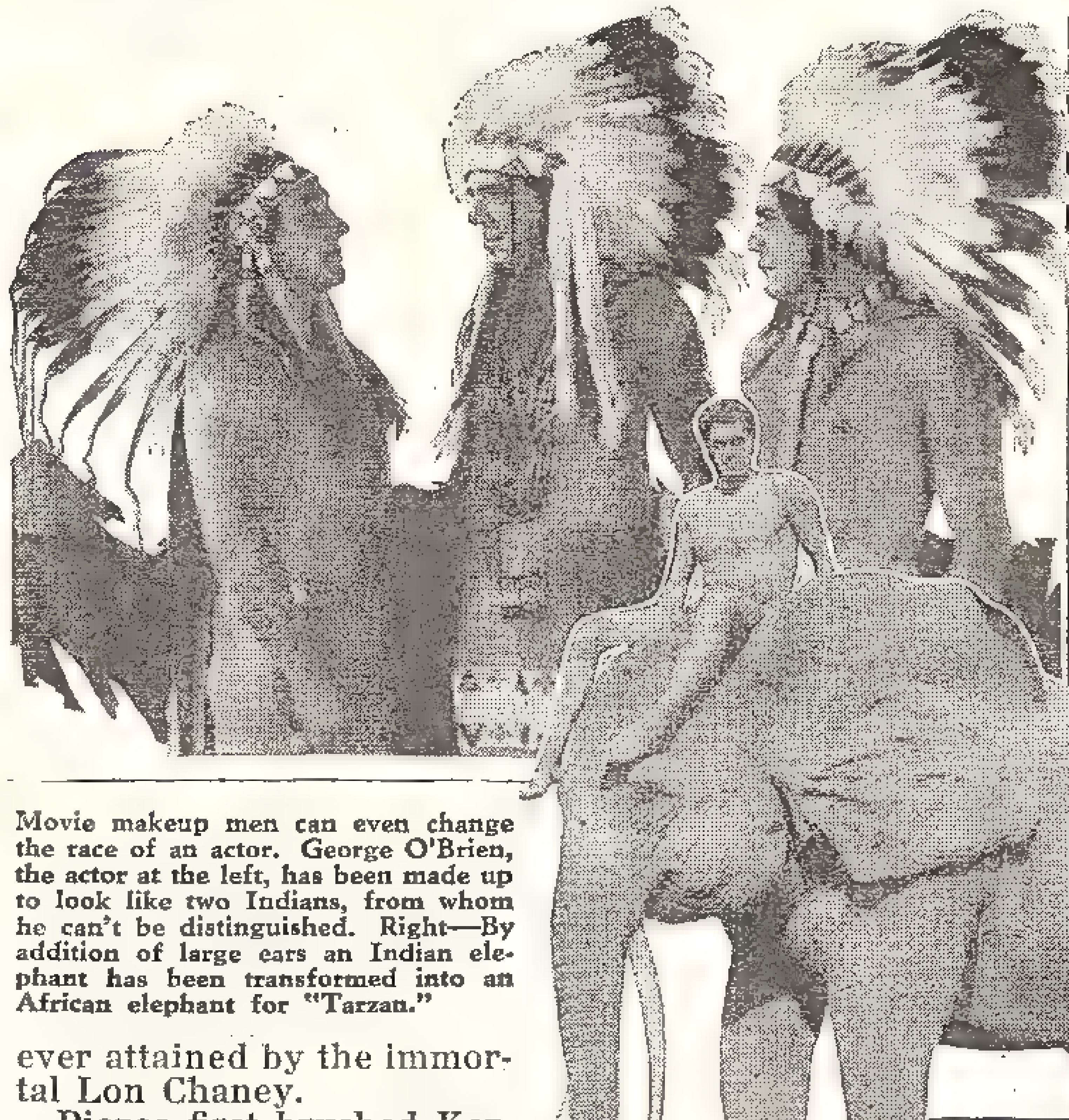
charred the cloth without actually burning it.

Pierce experimented with 20 dry colors until at last he looked down into his mixing pot on exactly the yellow-gray color with which good mummies are covered. Burnt umber, light umber, fullers' earth, other colors, glue and hot water combined to produce this mud-like substance. With a little cotton and the standard make-up pigments Pierce was ready for the big job—a seven hour ordeal—of turning back the pages of time 3700 years, all for a five-minute effect on the screen.

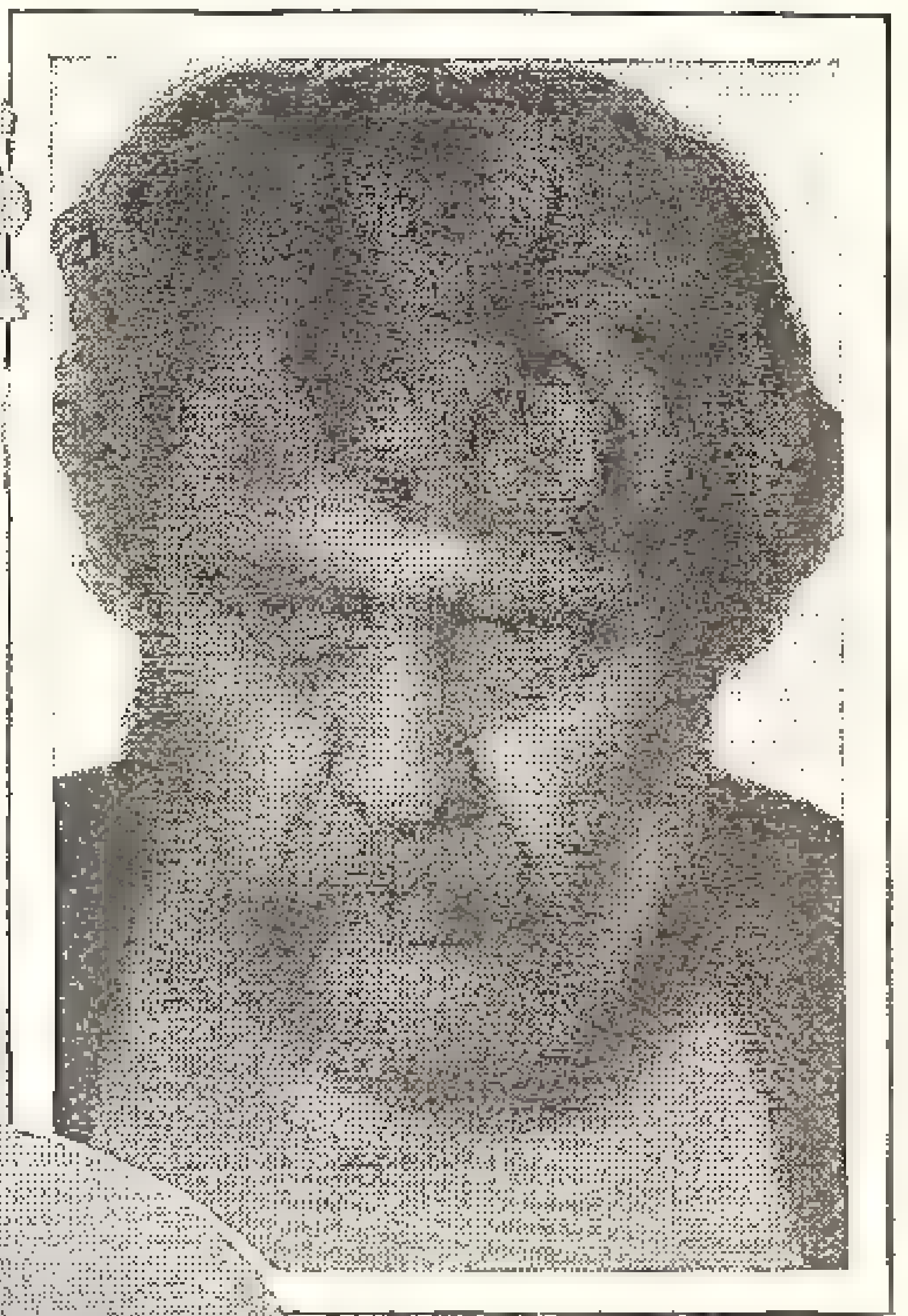
"Wrapping Karloff," Pierce told me, "was the hardest job I've faced during twenty years in the motion picture business. Cooking the cloth gave it the appearance of cloth that had rotted under the earth, but it had become so fragile that it sometimes fell apart in my hands.

"Yet it was necessary to wrap him in three directions—around, vertically and diagonally—so the layers would not separate and reveal his skin. Despite these three layers, when he opened his eyes and moved from his casket, the outer layer crumbled like a thick layer of caked mud and disappeared in a small cloud of dust."

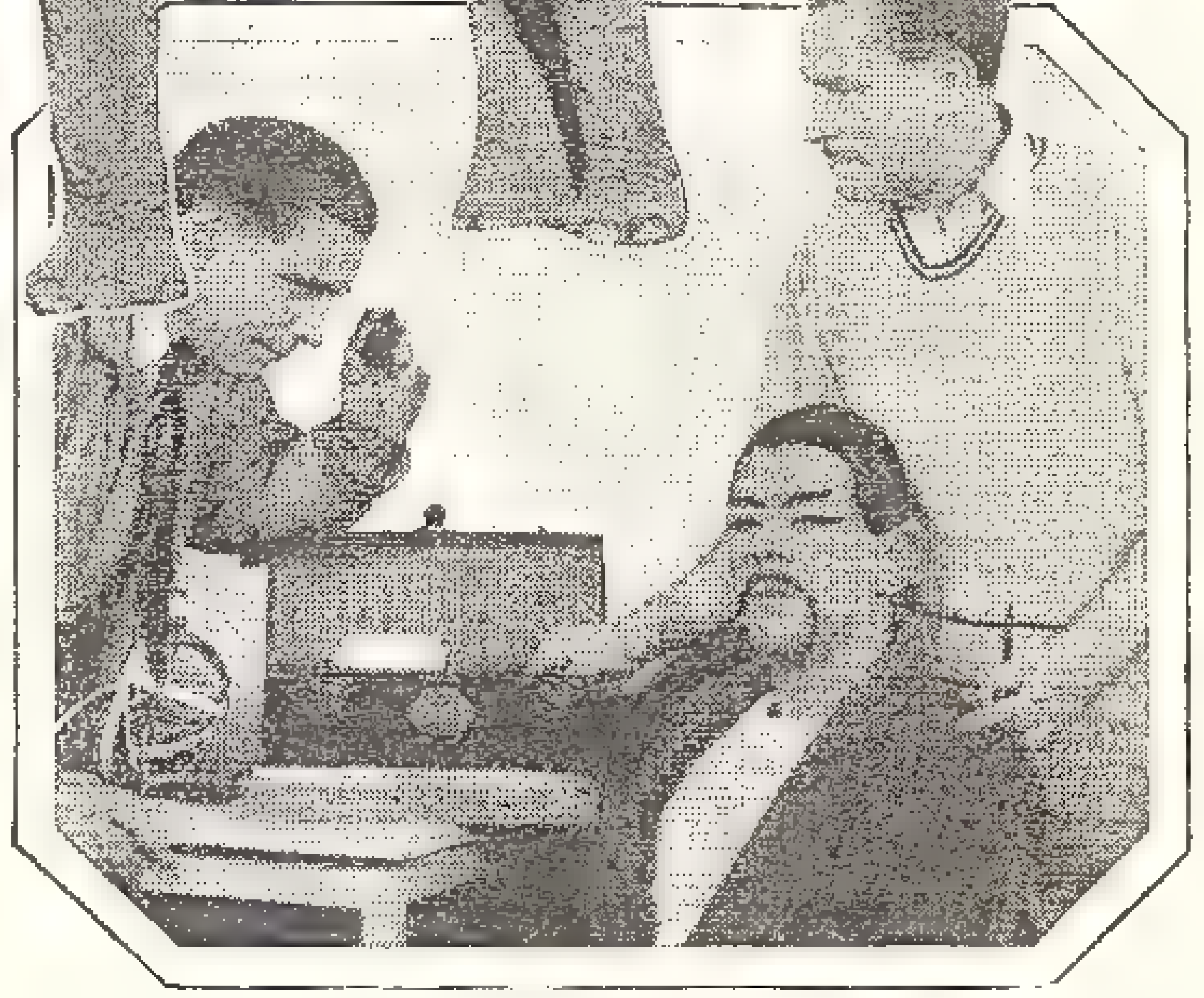
Caked mud really covered the bandages, having been brushed over the cloth. The glue held it together after it had dried, the water gave it the necessary moisture to permit working the colors. Yet the startling and grotesque effect came not so much from the decayed appearance of the body, as from the hands and face. Here was a triumph of movie makeup, as great as any ever attained by the immortal Lon Chaney.



Movie makeup men can even change the race of an actor. George O'Brien, the actor at the left, has been made up to look like two Indians, from whom he can't be distinguished. Right—By addition of large ears an Indian elephant has been transformed into an African elephant for "Tarzan."



Recognize the actor above? It's Jean Hersholt in a distinctive makeup — in fact, a masterpiece of the makeup man's art. Note tousled hair, furrowed face, scraggly beard.



To determine whether any flaws will register on the film, cameraman must study makeup of characters through his blue glass, as demonstrated here. Nils Aster is the actor.

Pierce first brushed Karloff's face with a special gum, a secret formula, that retained its moisture so long as the makeup remained on the actor. Over the gum he plastered a thin layer of cotton, specially prepared for this type of work. After the cotton had "set" in the glue, with a pair of tweezers, Pierce pulled out the excess, leaving little valleys where he planned to create the lines of antiquity. Thirdly, another layer of gum was brushed on the cotton, this to hold the outside in exactly the same position as created by the tweezers.

While the face was drying under the hot blast of an electric heater and fan, Pierce turned to the hands. The same process served here.

Actor's Face Made to Look Dead

Having destroyed all life in the face—in fact, having quite obliterated its human resemblance—Pierce found he must restore something of a human quality. A layer of ordinary grease paint supplied an appearance of skin and normal pores and enabled him to deepen the lines in the cotton with a dark brown pencil. This accentuated the deep crevices.

Now a lighter shade of grease paint, spotted on the cheeks, brought out the high lights and depths so essential for the camera.

Technically the most difficult problem came in making up Karloff's hair, for Pierce found he must turn the natural black into an aged yellow. No wig would do here.

A layer of liquid grease paint, neutral in color, supplied the base. On top of this was patted a mixture of facial beauty clay and fullers' earth. All of which transformed the top of his head into a dirty matted yellow, exactly as the hair on mummies found in recent years looked after nearly forty centuries under the earth.

Final touches for such an exacting makeup are applied after the actor reaches the great sound stage. There Pierce completed wrapping Karloff's legs together and sealed his eyes closed with rice paper, leaving a little horizontal valley in the center of the

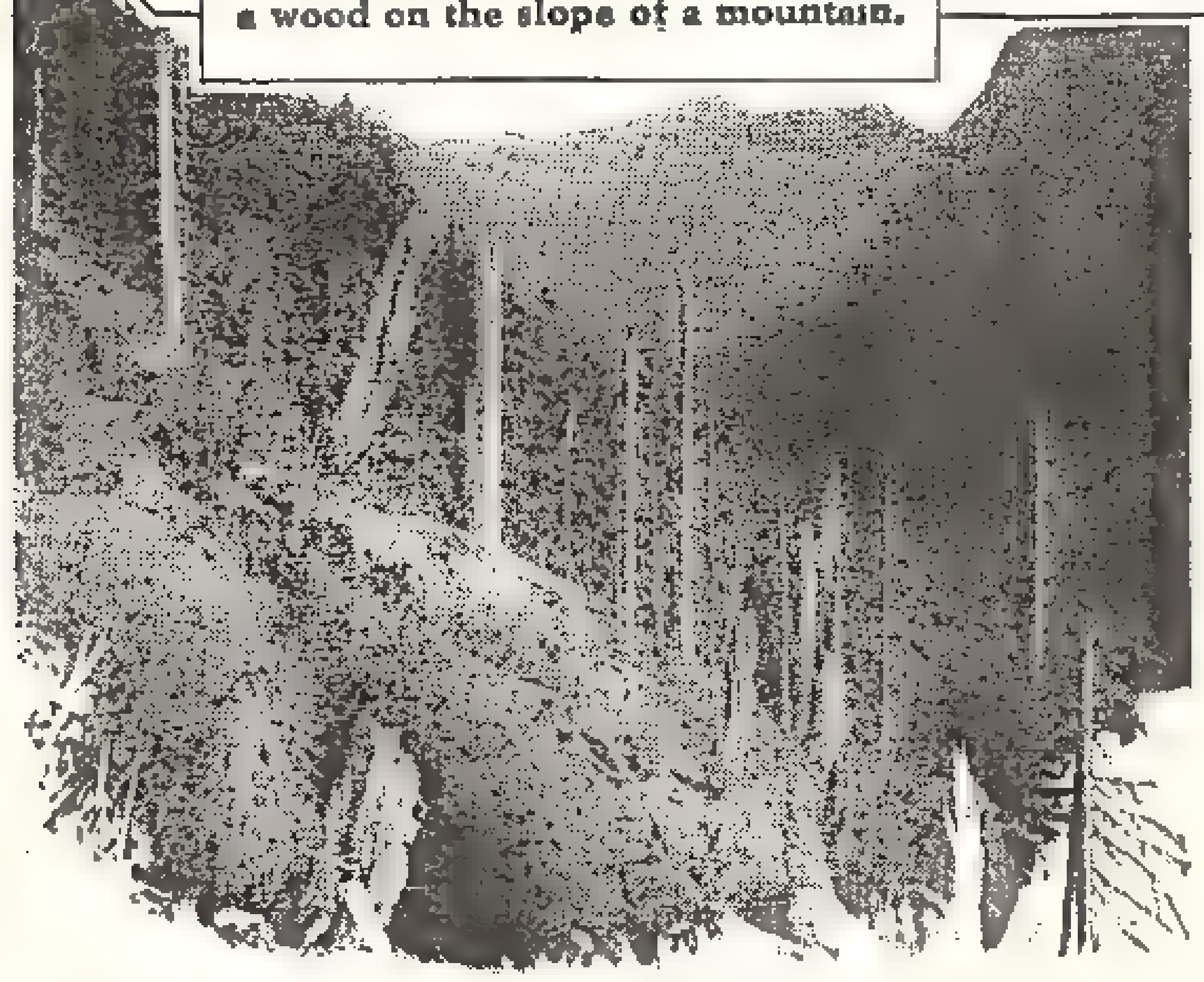
(Continued on page 145)

Engineering GENIUS Fights the Destructive Avalanche

The aftermath of a snowslide which occurred at Bingham, Utah, in February, 1926. Rescuers are seen digging out victims of the avalanche.

Striking photo above shows how an avalanche swept a path through a wood on the slope of a mountain.

The avalanche, nature's most destructive monster, now submits to the intelligence of modern engineering genius, whose methods of control are explained here.



These denuded and splintered trees are part of the wreckage from an avalanche wind, generated by the displacement of air in the front of a snowslide. Such winds reach forces greater than hurricane. Entire villages have been devastated by avalanche winds, though untouched by snow.

by CALVIN FRAZER

"SNOWSLIDE Hits Train; One Dead, Four Missing." "Colorado Snowslide Buries Four Miners." "Twenty-one Italian Soldiers Killed by Avalanches." "Thirteen Ski Tourists Perish in Avalanche."

These four headings were selected at random from a large collection of newspaper clippings, all of recent date, relating to disasters due to the terrific cataracts of snow that sweep down the steep slopes of mountains in all parts of the world; often with dire results, though fortunately the vast majority of these slides are harmless, either because they occur in unsettled regions or because various protective measures against them have been taken by mankind.

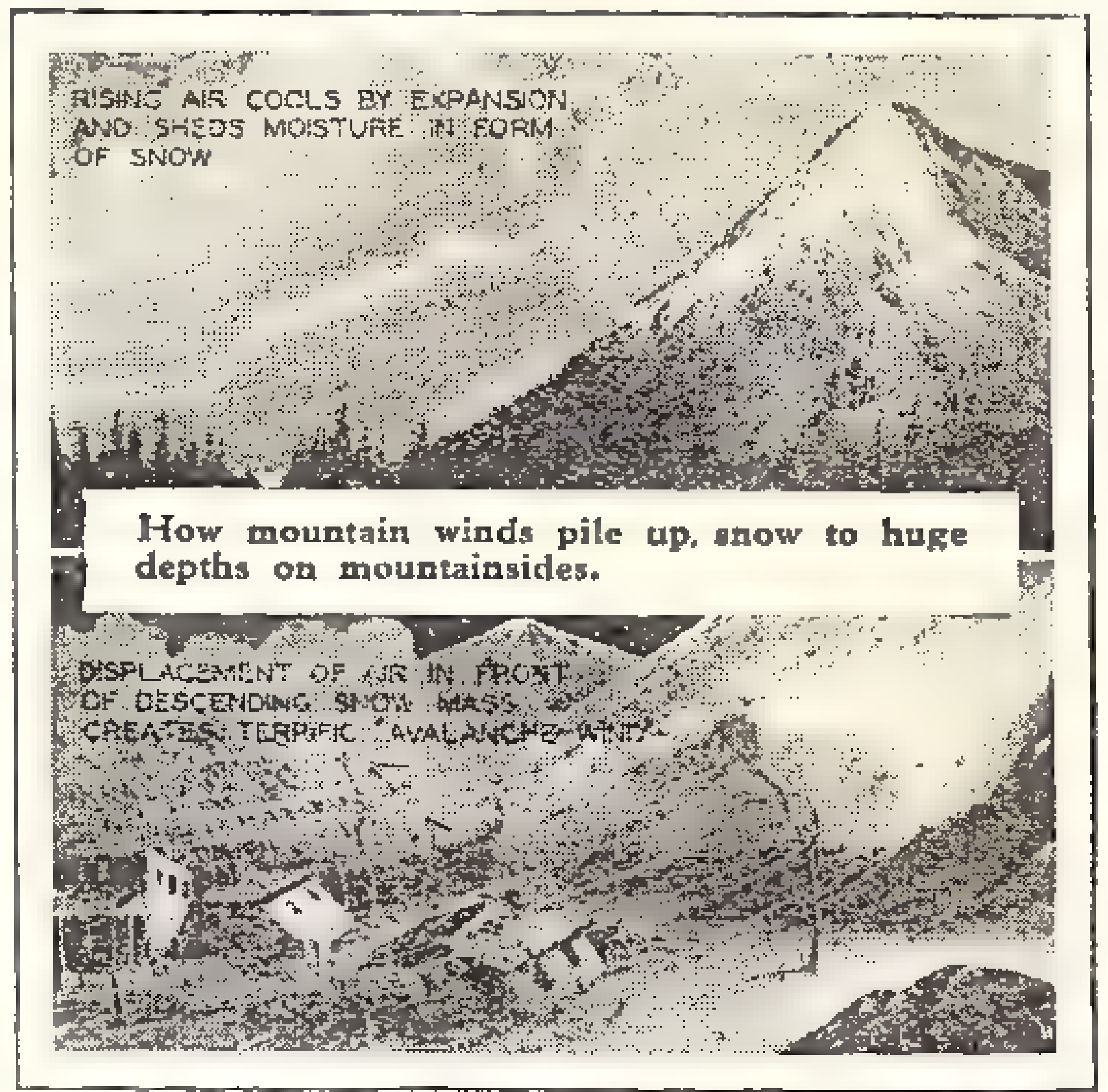
People who live in non-mountainous regions may think of the avalanche as a somewhat rare event. It is true that *destructive* avalanches do not occur every day, but those that have no serious consequences and hence fail to get into the newspapers descend the mountains of the globe by the millions in the course of a year. It is easy to see why this must be so.

A mountain, because it projects up into the colder regions of the atmosphere and especially because it forces the winds that blow against it to rise, cool by expansion and shed their moisture, is a great collector of snow as compared with the surrounding plains. Of the snow thus gathered part is removed by evaporation, part melts and flows down as water, and part, gradually compacted into ice, creeps slowly down in the form of glaciers. Some is also blown from the peaks and higher slopes by the winds, but a vast amount remains to be removed by the speedier process of the snowslide or avalanche.

Roof Slide Is Small Avalanche

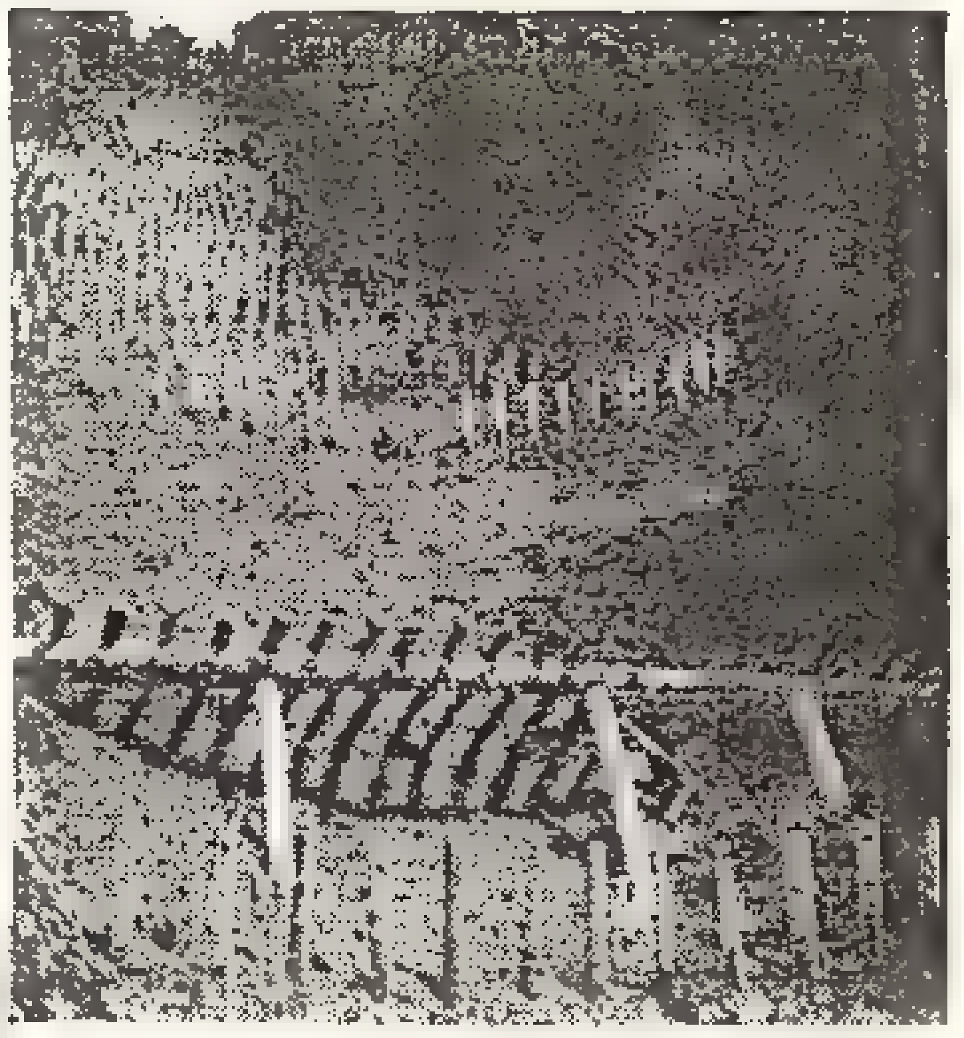
If you live in a snowy part of the country you will probably witness avalanches on a small scale this winter on sloping roofs in your vicinity. The snow may become saturated with water until, no longer able to adhere to the shingles beneath, it slides off and thuds to the ground, or again, in colder weather, it may remain dry but eventually accumulate in such quantities that some slight jar will start it down.

The same two varieties of avalanche occur in mountains. The former is called a "ground" avalanche, and is commonest in spring; the latter, known as a "dust" avalanche, is confined mostly to winter and consists of dry, powdery snow, great clouds

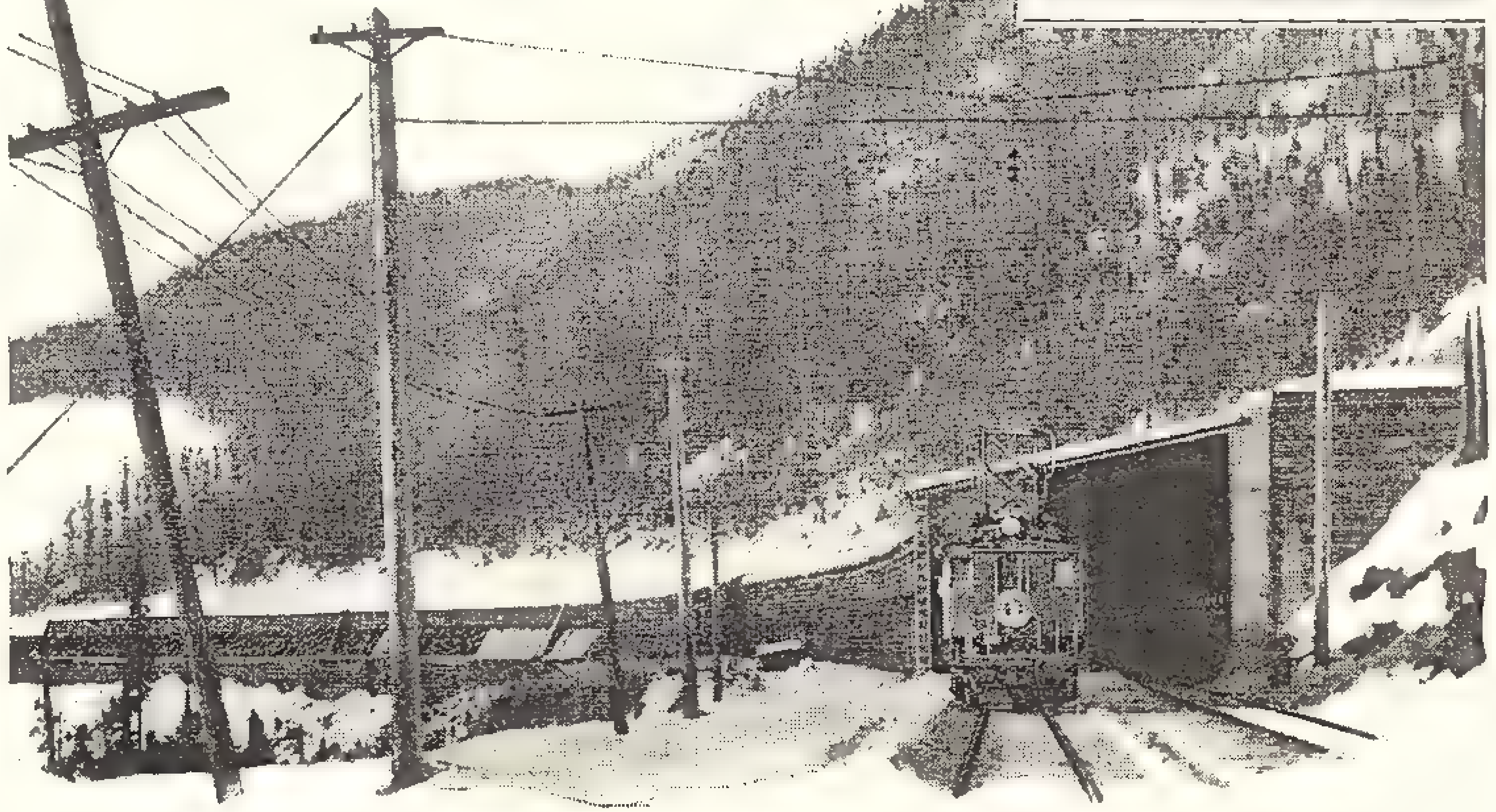


RISING AIR COOLS BY EXPANSION AND SHEDS MOISTURE IN FORM OF SNOW
DISPLACEMENT OF AIR IN FRONT OF DESCENDING SNOW MASS CREATES TERRIFIC AVALANCHE WIND

How mountain winds pile up snow to huge depths on mountainsides.



Drawing above shows how terrific avalanche winds are created. In Switzerland, a mountainous country, elaborate precautions must be taken to guard against avalanche disasters. Photo at right shows rows of stakes driven into the ground to break up and retard snowslides.

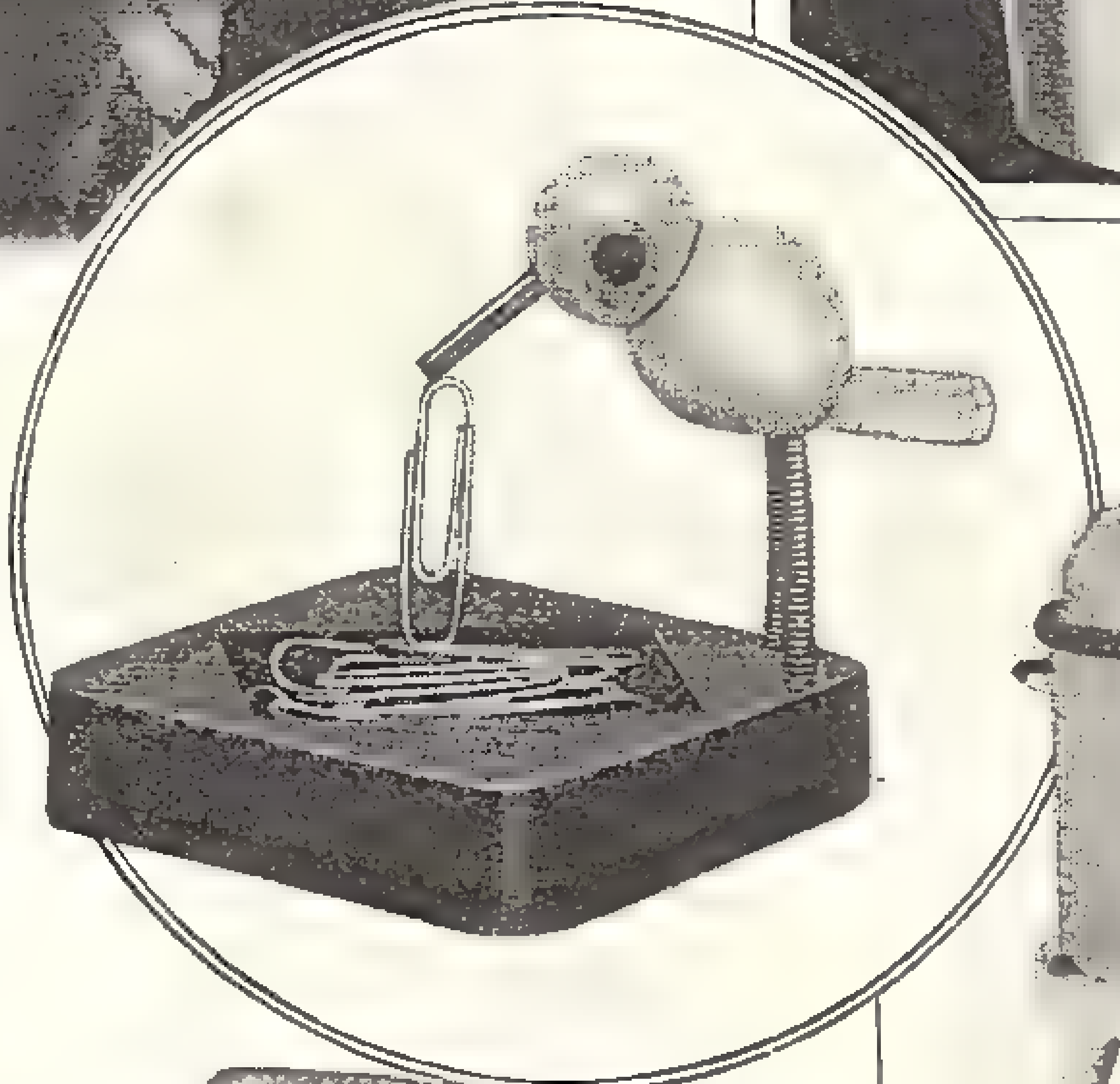


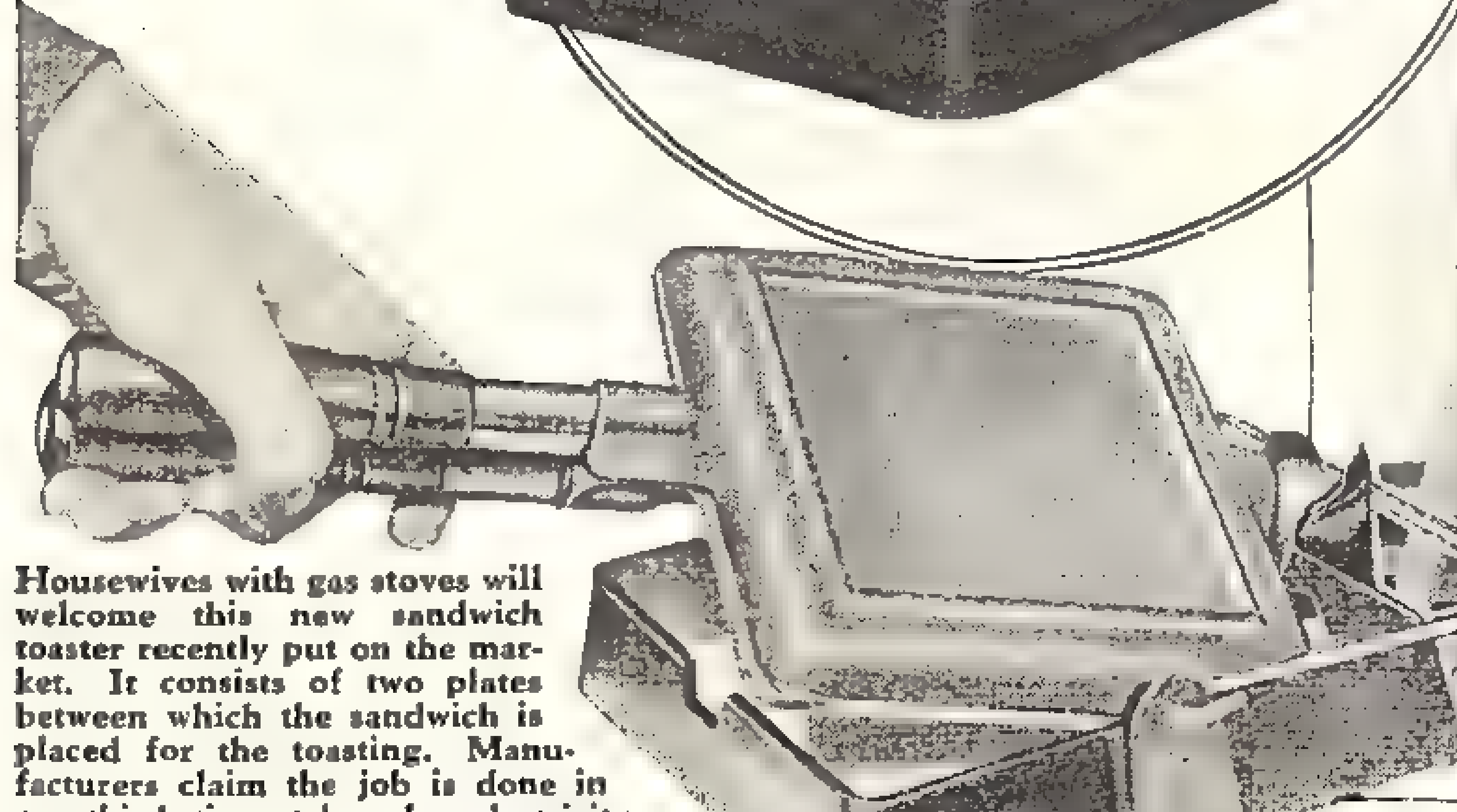
On mountain railroads both in Europe and America, tunnels and snowsheds such as the one shown above furnish a partial protection from the unstable snowfields. Avalanches descend upon roof, leaving tracks clear for fast trains. Construction of sheds must be substantial and bracing secure to withstand the crushing fury of thousands of tons of snow.

New MECHANICAL AIDS for BUSY HOUSEWIVES

This new contrivance attaches to a milk bottle and converts it into a convenient little pitcher for the dining table. At right is seen Mr. "Pickadoodle," who bends down and with his magnetized beak picks up pins or wire clips. His feet are springs.

Here's the new "Tell-U-How" cocktail mixer which shows you ingredients for your favorite drinks, and measures contents.





Housewives with gas stoves will welcome this new sandwich toaster recently put on the market. It consists of two plates between which the sandwich is placed for the toasting. Manufacturers claim the job is done in one-third time taken by electricity. The square base sets over the gas burner in the toasting process. Note the ingenious ball joint for reversing the plates. Wooden handles give adequate insulation against heat from the flames.

Ideal for small apartments is a small electric washer now on the market which prepares the washed clothes for the line without the use of a wringer. Concealed in the top is a soft rubber bag which is expanded by water pressure to wring clothes.

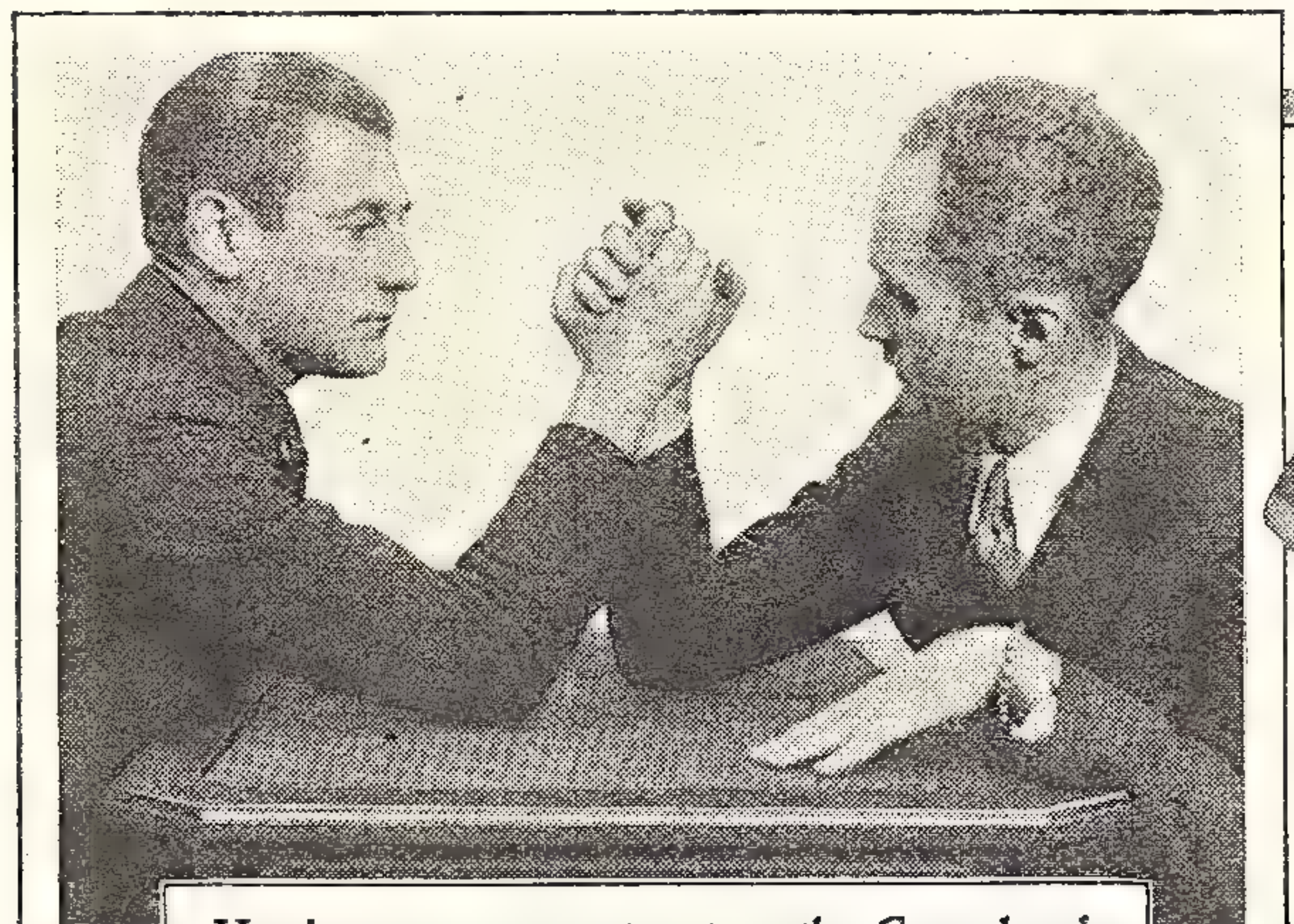
Above—Bell on bottle of dangerous medicine rings warning. Right—New air-tight rubber bottle stopper which seals bottles of catsup, grape juice, etc.

New automatic baby feeder that may be adjusted to any height on the crib by simple twist of wrist.

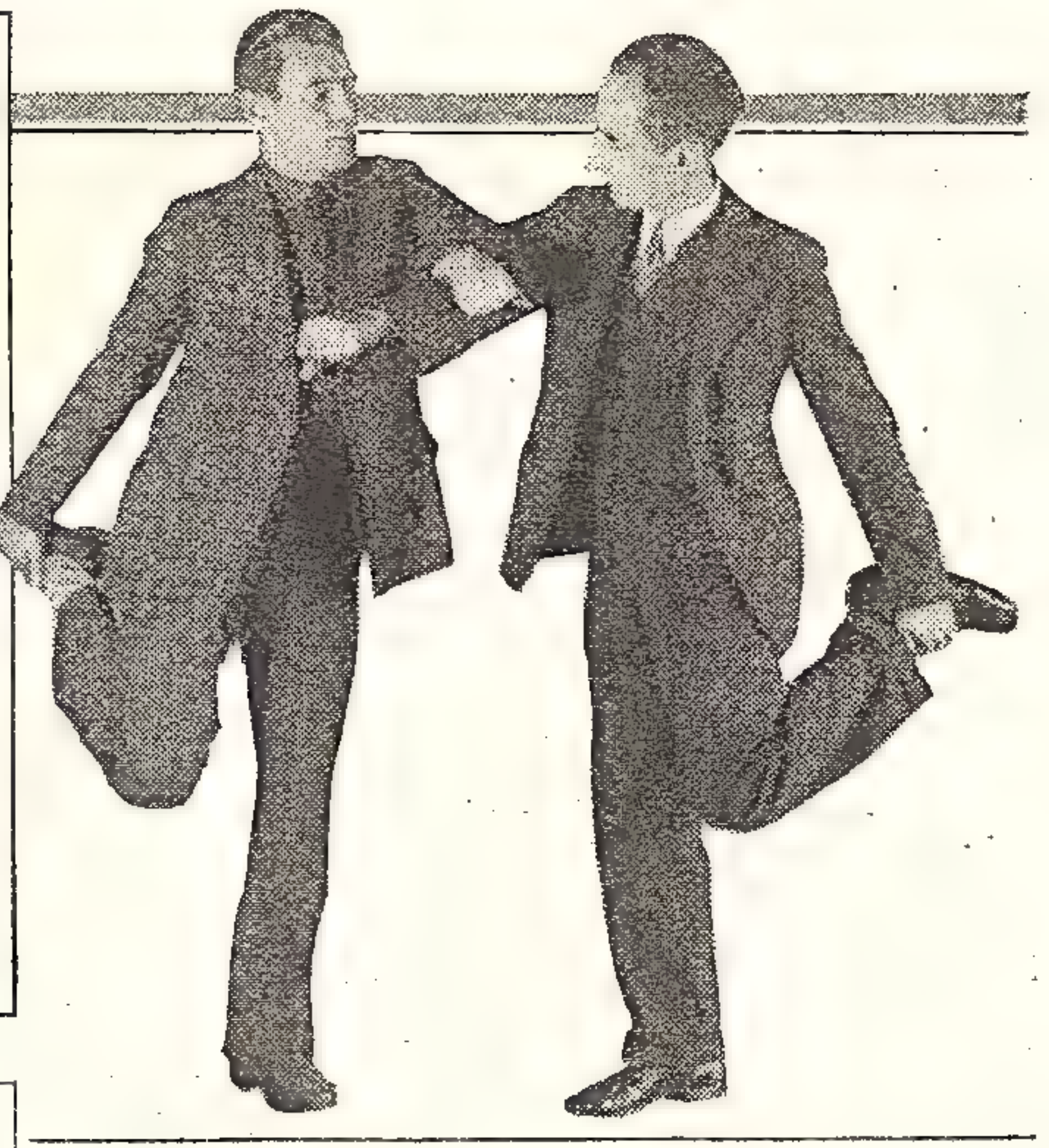
Latest aid to milady's beauty is this "Kurlasher" which curls the lashes to make eyes more attractive. No heat is required and the device is entirely harmless to the user.

A new kind of cover loosener is now available in the form of a soft rubber ring made to slip over fruit jar covers. It has a series of tiny teeth-like grips which obtain an extremely firm hold on the cover and loosen it immediately without straining the wrist.

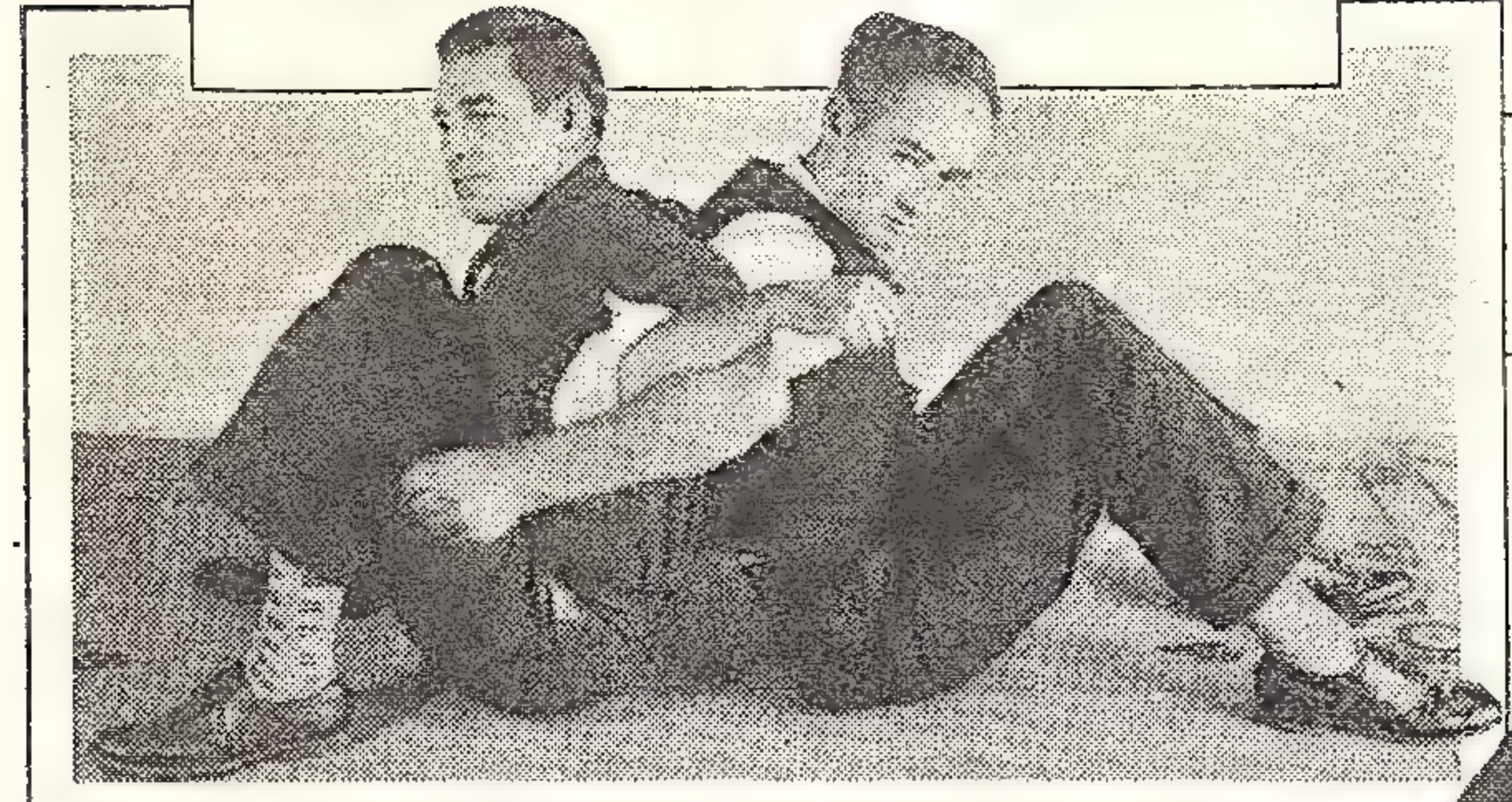
Master These Strength Tests OUTDO Mightier Opponents



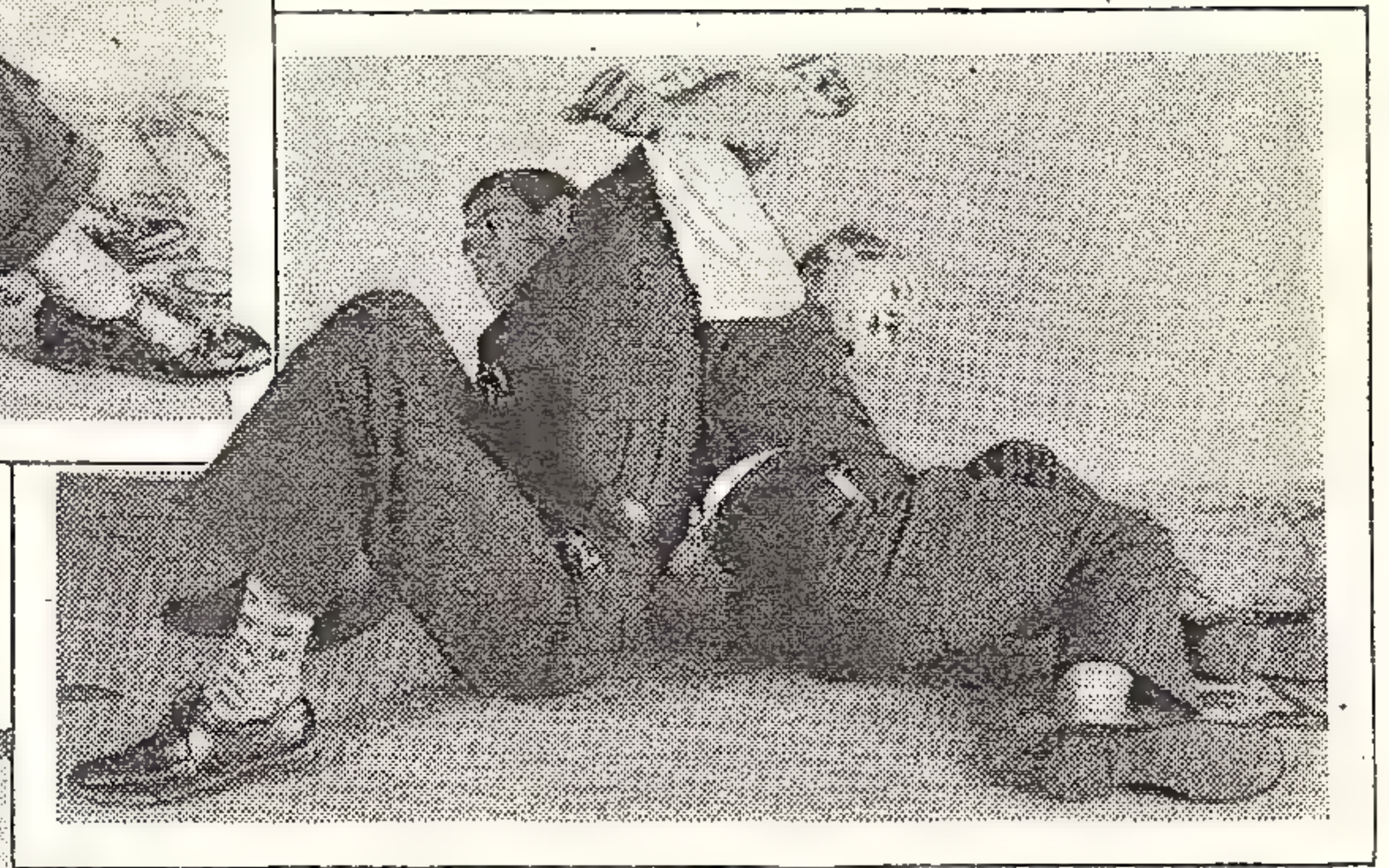
Here's a way to test arm strength. Grasp hands firmly, with elbows placed on table top. At word "go", try to force opponent's hand to table.



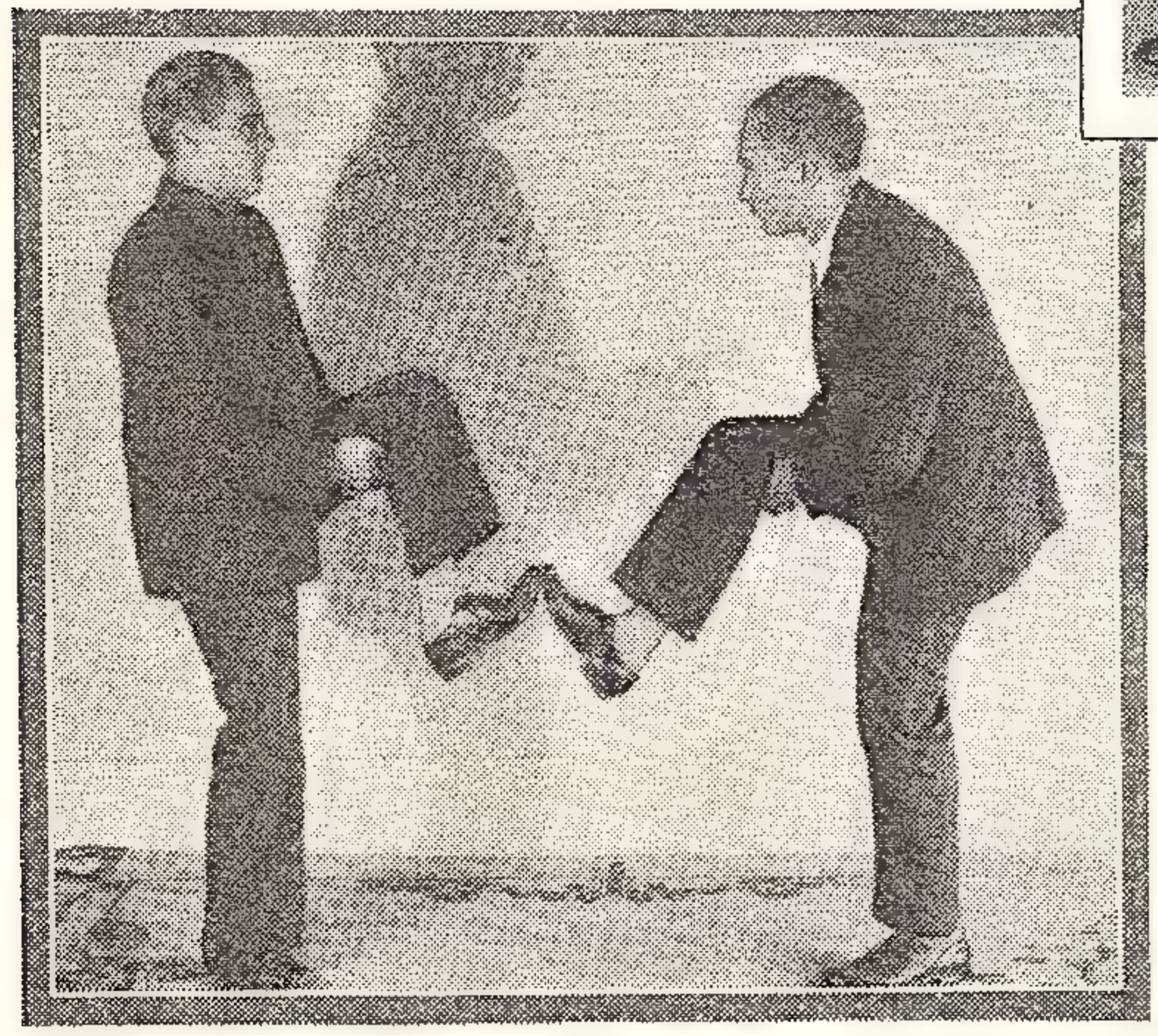
One of the best party stunts imaginable is this balancing test with arms locked and one foot held off floor.



This is a novel method of wrestling which brings into play the muscles of the arms and back. Assume the back-to-back position with knees raised close to chest. Arms are locked with those of your opponent.



Here's how you work the stunt shown at left above. The idea is to upset the opponent from his seated position on the floor while retaining the back-to-back position. It is possible to stand an opponent on his head.

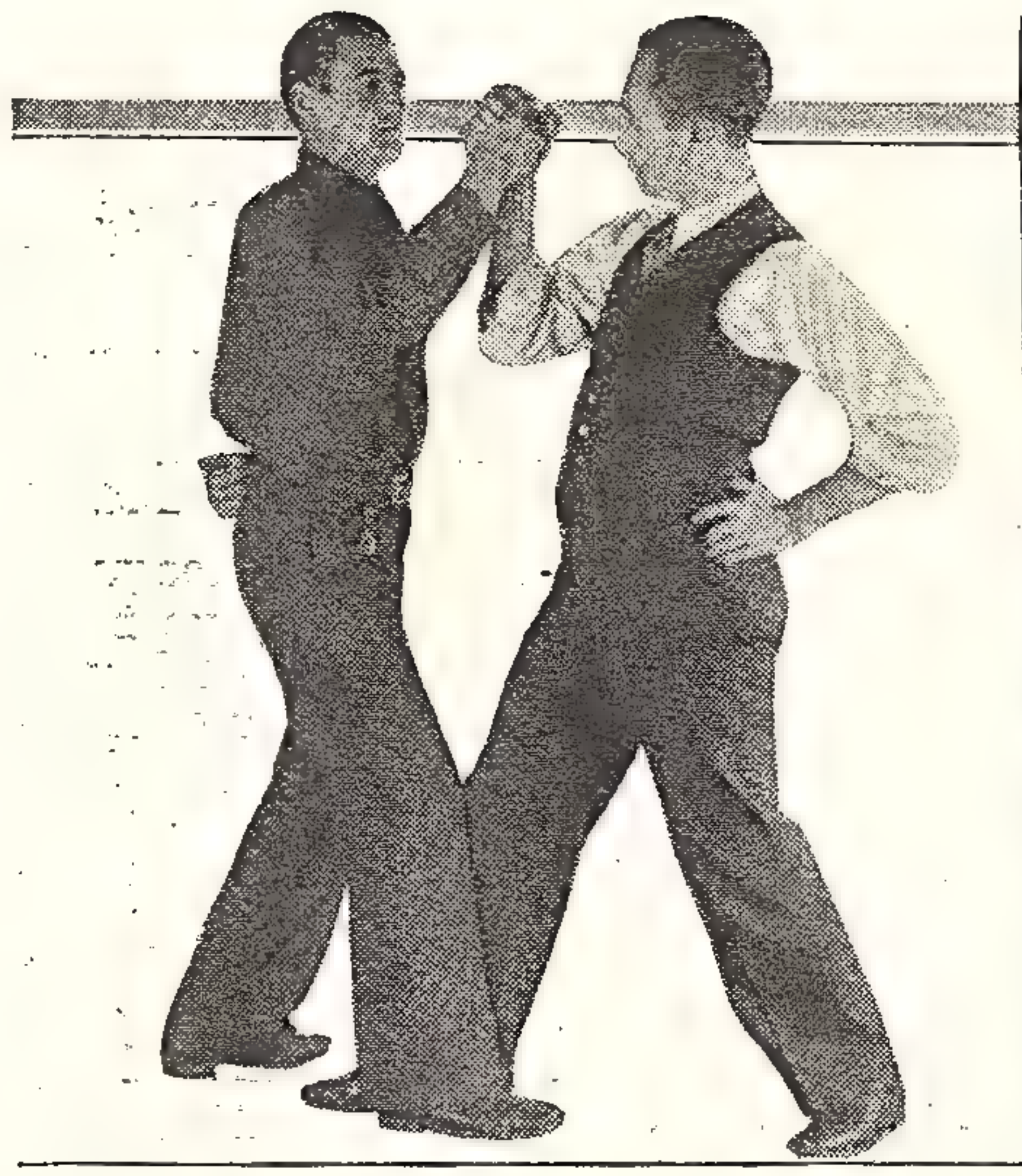


Fun galore may be had with this "foot boxing" test. Clasp hands underneath upraised leg and place toes to those of the opponent. Push with toes and try to force opponent off balance. First to unclasp hands is the loser. Plenty of exercise in this, besides testing leg strength. Frequent spills of contestants make this an excellent party game. A little practice will enable you to win easily.

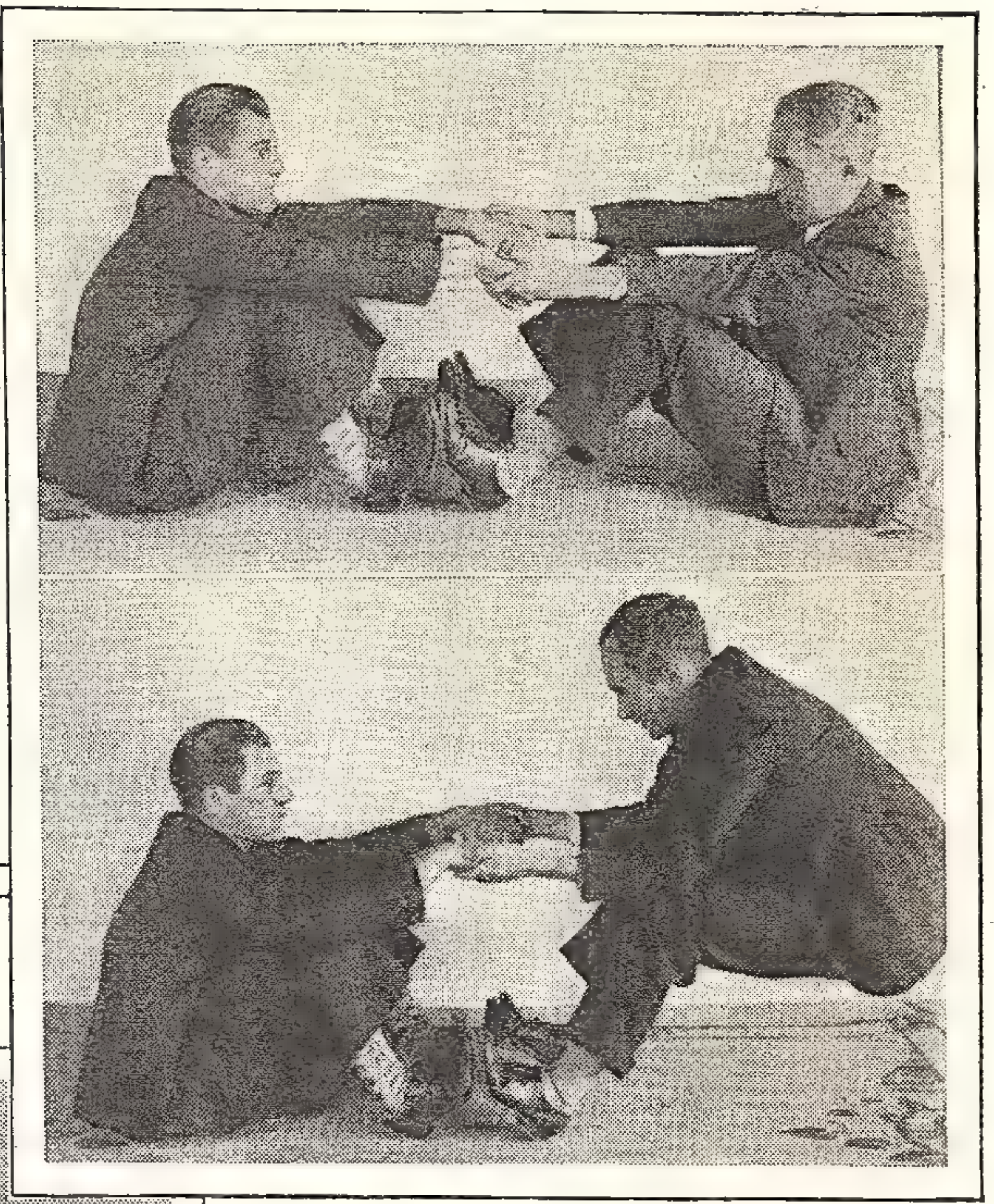
DO YOU want to compare your strength with that of your friends? If you do, here are eight different methods, all simply executed, that will bring into play every muscle of the body. Master these feats and you can hold your own with men of much greater bulk, because they will have failed to develop the distinct muscles brought into use in each of eight separate tests.

The first known use of one of these methods, shown in extreme upper left hand corner, dates way back to 1849 when a grizzled miner challenged a "dude" Easterner while both were partaking of liquid refreshments in a California saloon. The "dandy," having practiced the feat before, offered it as a test. The struggle lasted well over an hour while the two men tensed and flexed their muscles, perspiration pouring from determined faces. Strangely enough, to the onlookers but not to the Easterner, the miner was finally overcome. The winner had developed his arm muscles and knew how to use them to the best advantage, something neglected by the miner.

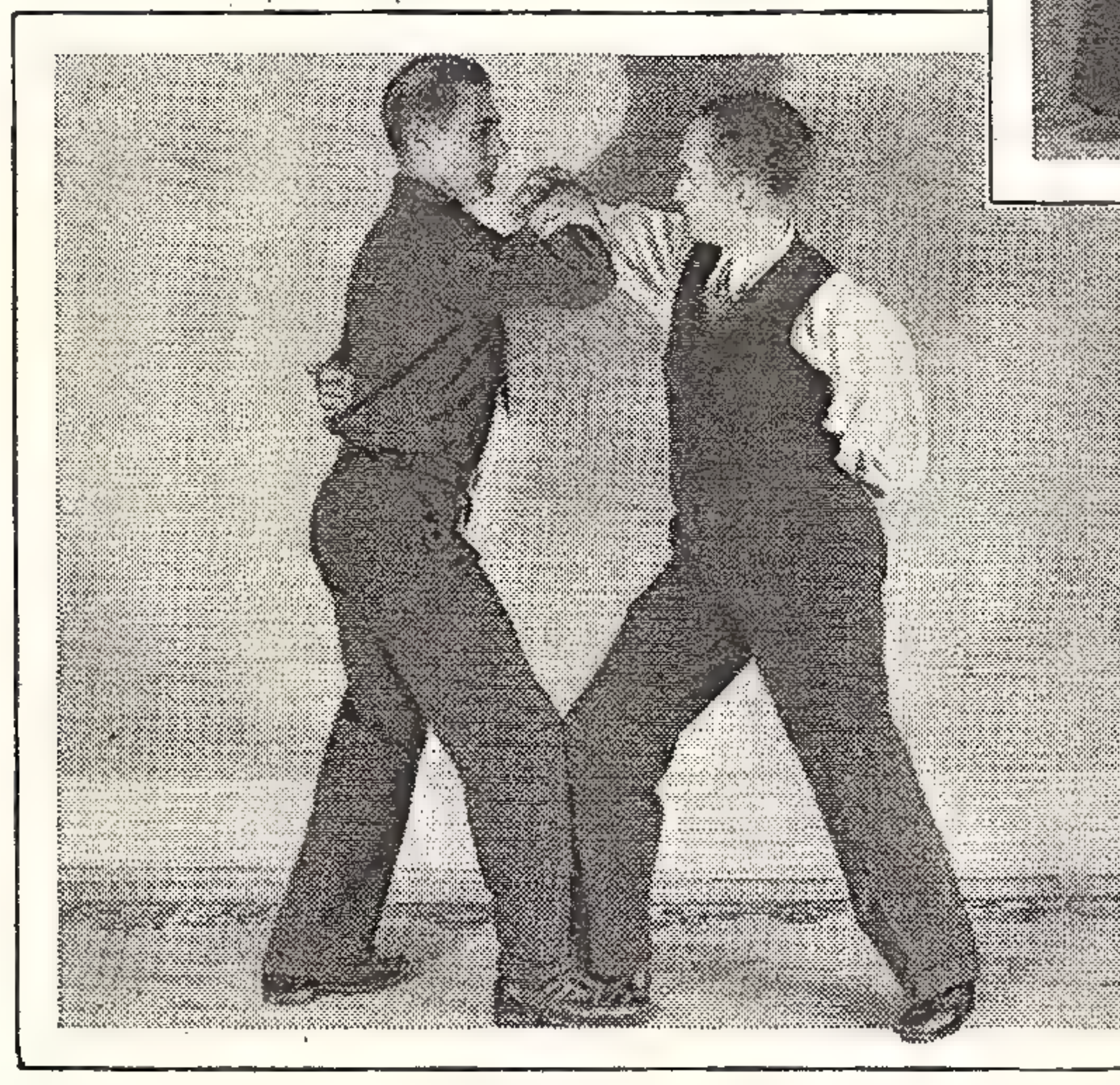
Master these tests and then introduce them at your next party. You will be surprised at the amount of fun derived by the participants as well as the onlookers. Most of the guests will not be familiar with them, and so will meet on equal ground.



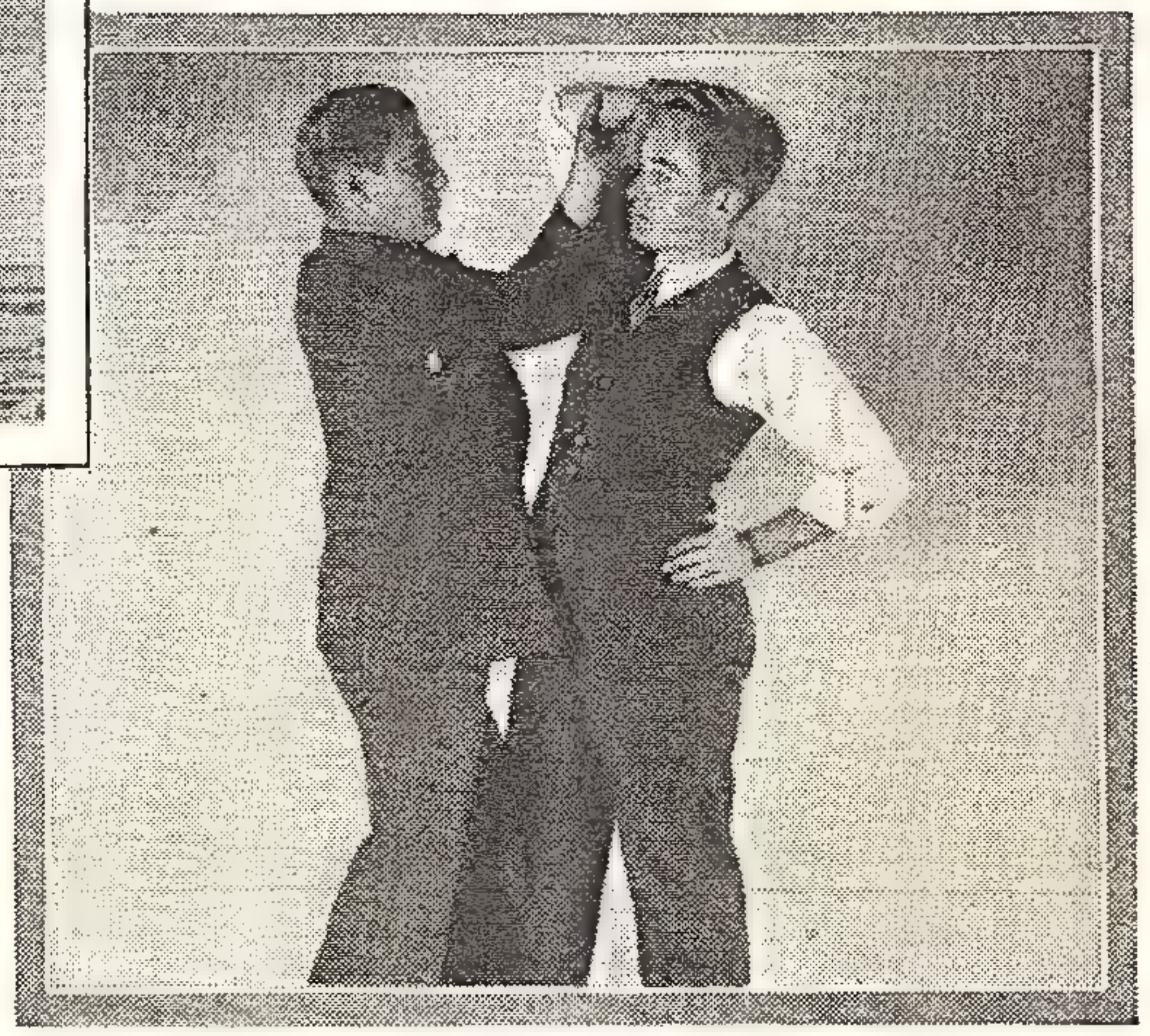
This stunt is similar to the one shown in the upper left hand corner of opposite page except that contestants are standing, with knees touching.



Another good party stunt, one that requires power in the arms, is shown in the two views above. Participants sit on the floor; legs upraised, toes touching and hands clasping. At a signal, they exert all of their strength in an effort to lift the opponent off the floor. If two persons of nearly identical strength take part, the tugging is fast and furious for some time.



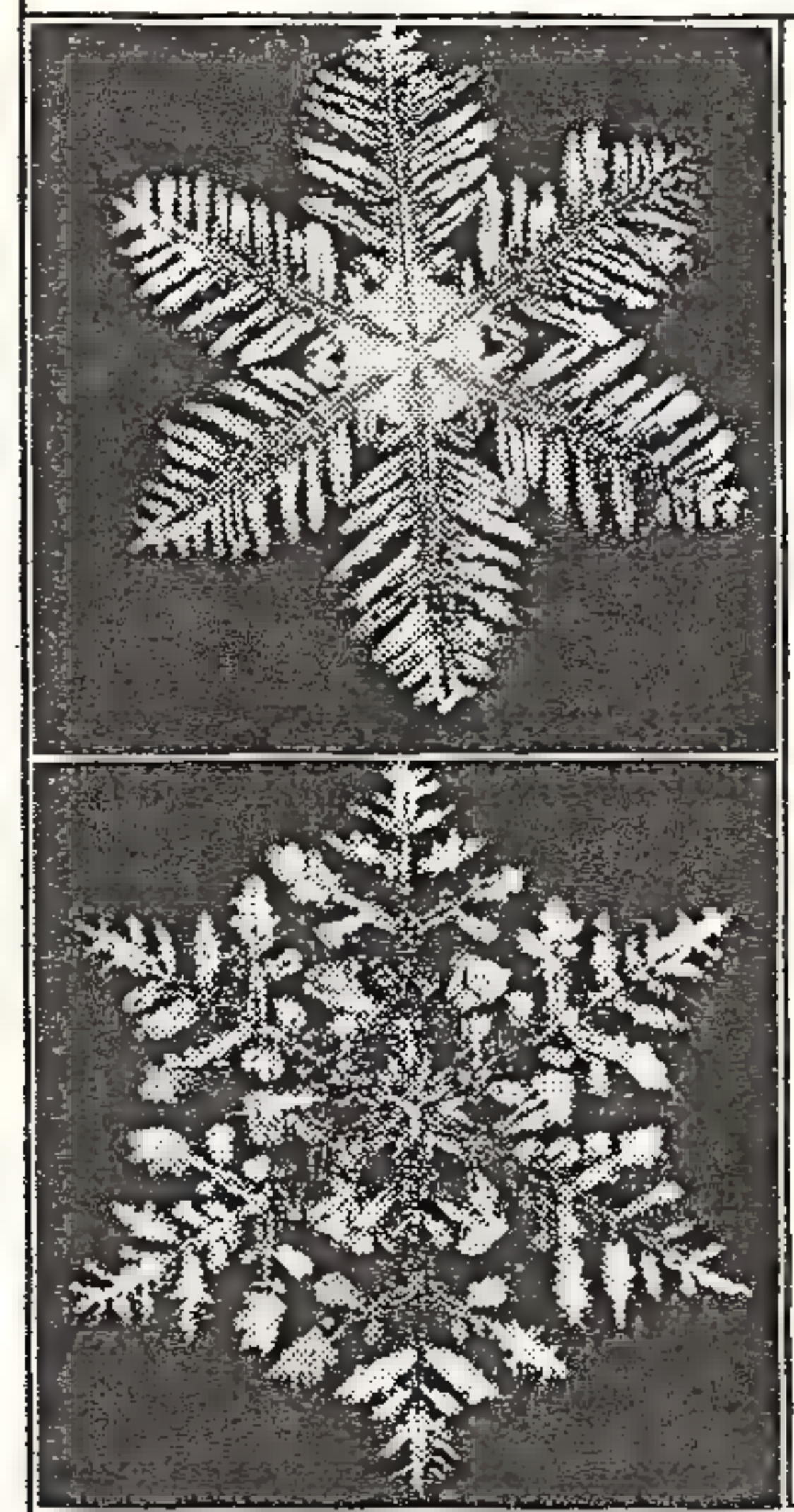
Participants stand with knees together and right arms grasping each other's elbows. The left hands are held behind the back. It is usually quite a struggle before one or the other of the two contestants is pushed off balance.

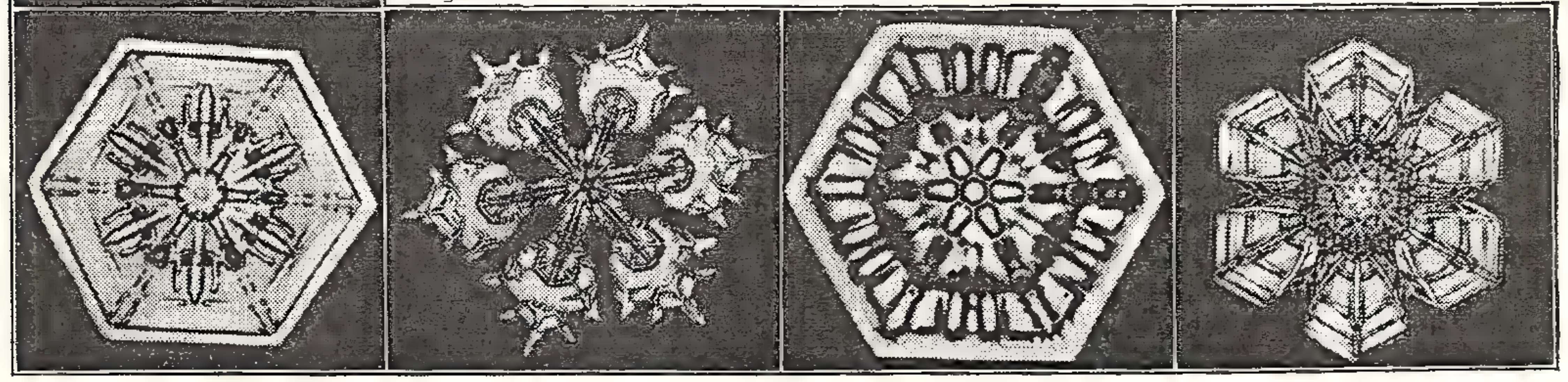


This stunt is the only one that has a trick connected with it. Hold your hand atop your head and ask anyone to lift it off. If you are of equal height or taller than the "lifter," he must take the position shown. The strength in your arm will be sufficient to withstand the strength in both his arms, due to the extremely poor leverage.

SNOWFLAKES—*Artistic Masterpieces of* NATURE

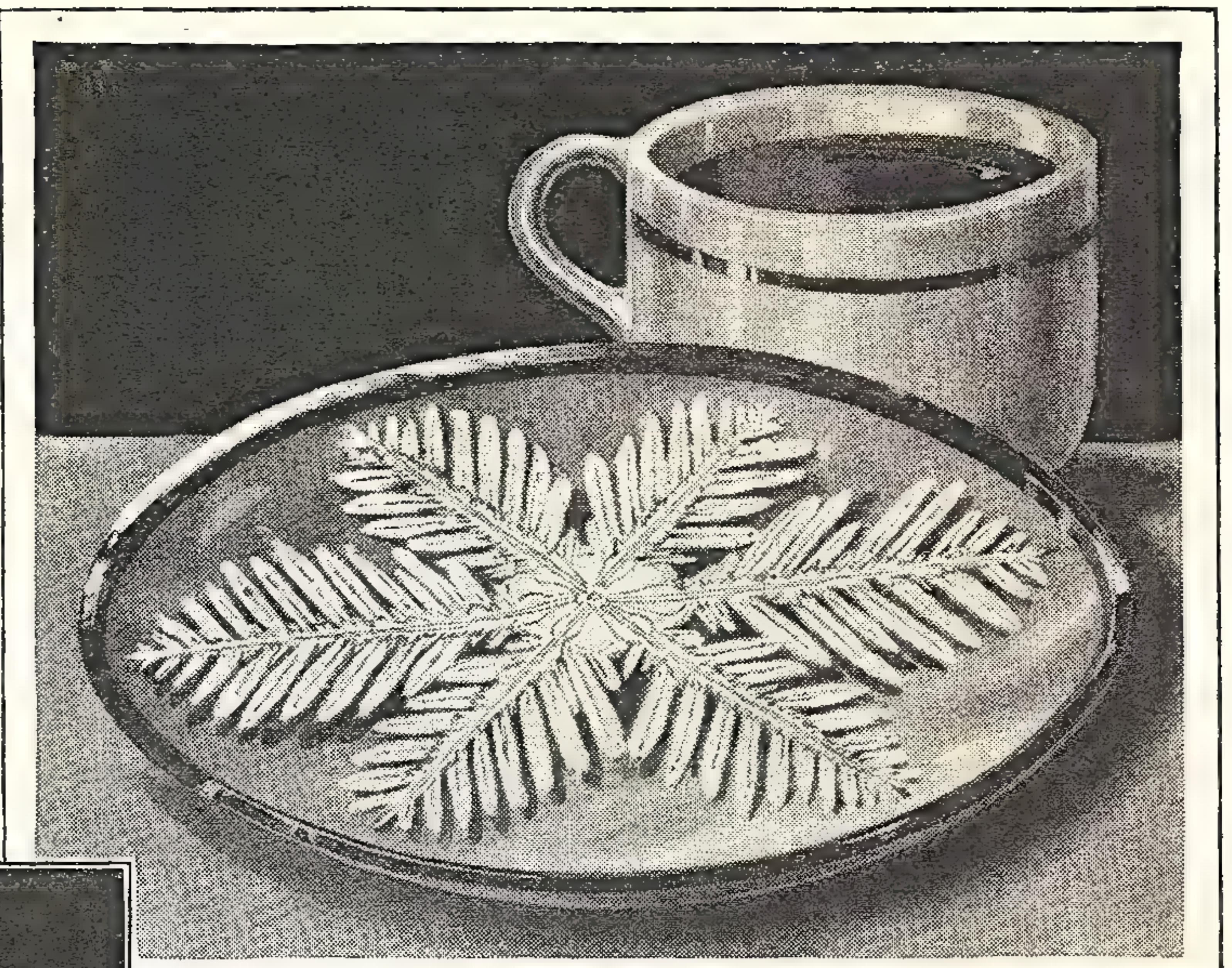
In this record precipitation in Chepstow, England, two inches of snow fell in two minutes.





Few of the myriad fantastic geometrical shapes which snowflakes assume as they fall from winter skies are shown in these artist's drawings. These flakes may be perfect, single snow crystals; as, for instance, during the beginning of a snowstorm when the air temperatures are well above freezing. More often, however, they are groups of several partly melted snow crystals which have come together and adhered to each other during their journey through the clouds. Note that all the patterns are six sided. Being minerals, snow crystals follow the laws of crystallography.

Take a good close look at a snowflake some of these days and you'll be surprised at what you see. Geometrical patterns that no artist could design will greet your eyes. This fascinating story will tell you some astounding facts about these snowflakes—how they are formed and how they sometimes attain to gigantic sizes.



Maybe you won't believe it, but snowflakes five inches in diameter, almost as large as a saucer, have actually come down out of the skies. This phenomenal occurrence was recorded at Nashville, Tenn., on January 24, 1891. Gigantic snowflakes are simply masses of snow formed by the collision and adherence of many small snow crystals. Two or more of these crystals unite near the cloud level, forming a large snowflake which intercepts others as it falls to the ground, gradually becoming larger on its way earthward. Due to air friction, edges curl up causing saucer-like shape.

IF YOU have seen snowflakes an inch, or even three-quarters of an inch, across, come fluttering down from the clouds during a snowstorm, you have witnessed an interesting spectacle. However, you need not feel too much elated for, as the saying goes, "You ain't seen nothin' yet." Sometimes the pearly gems of frozen moisture come down in such sizes that a single snowflake will cover a good-sized saucer.

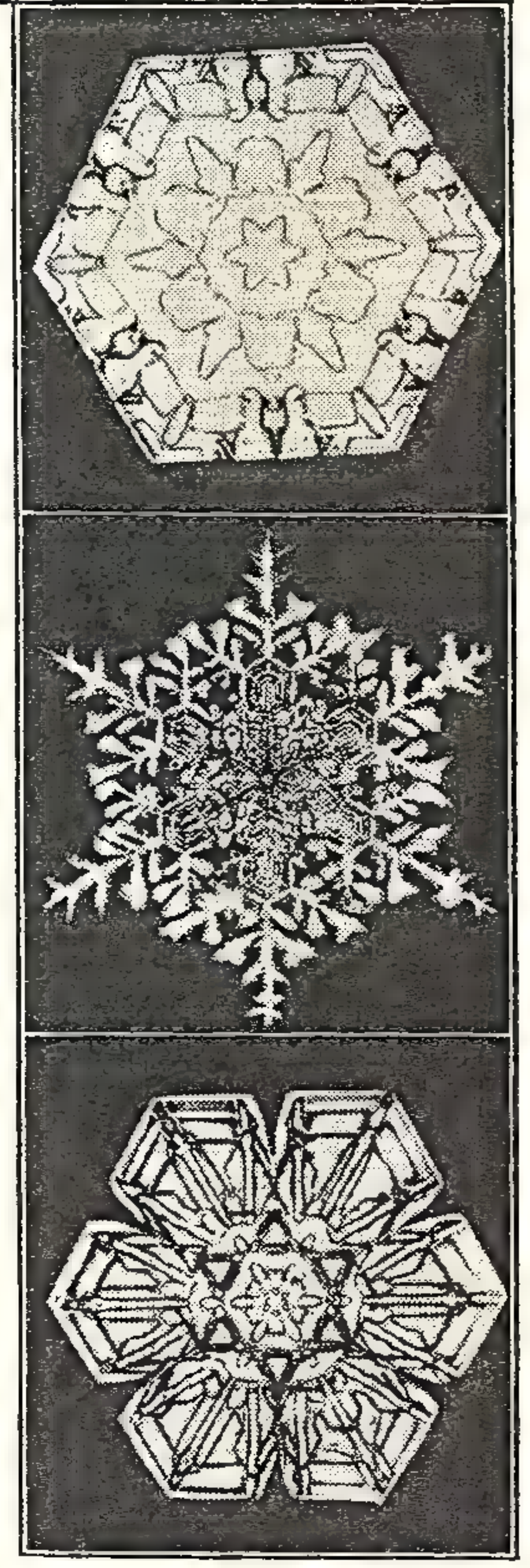
Sounds fishy, doesn't it? Nevertheless, it is no fish story. Such phenomena have been witnessed and recorded by reliable scientific observers in various parts of the world. E. J. Lowe, of Chepstow, England, reported three such cases. One was in January, 1838, when the largest snowflakes were about 2 inches in diameter; one was on January 7, 1887, when the largest snowflakes were more than 4 inches in diameter; and the third was on March 24, 1888, when the largest snowflakes were nearly 4 inches in diameter.

So far as can be found the 5-inch snowflakes which fell at Nashville, Tennessee, on January 24, 1891, were the largest real snowflakes which have been authentically recorded up to the present time.

Gigantic snowflakes, like those that fell at Chepstow, are simply masses of snow formed by the collision and adherence of many small snow crystals. Two or more small snow crystals unite near the cloud level, forming a snowflake somewhat larger than its neighbors. This snowflake intercepts others as it falls toward the ground, gradually becoming larger and larger on its way down. Due to the friction of the air, which tends to retard the falling motion, the edges of the snowflake often curl up, causing the characteristic saucer, or plate-like, shape.

Although the terms "snow crystal" and "snowflake" are often used synonymously, there is a real distinction between the two. Snow crystals are formed when the invisible atmospheric moisture condenses during air temperatures below the freezing point.

One interesting thing about snow crystals is that they are always six pointed or six sided. Snow crystals are minerals, just as diamonds are minerals. Consequently, when moisture condenses into snow it follows the laws of crystallography, just as other minerals do. Mineral substances crystallize during the solidification process whenever the molecules are free to move about and arrange themselves according to mathematical laws. In the case of snow this arrangement is always hexagonal or six sided. Anyone who has ever thrown snowballs knows that it is only the damp snow particles that cling together when their surfaces come in contact. Cold, dry snow crystals do not adhere when they collide.



Here are few more more shapes which flakes assume. These designs often provide artists with patterns for dresses, etc.

Artificial Radio SIGNALS Teach Blind Flying Safely

AN INEXPENSIVE and compact device for training flyers to pilot planes by radio beacon and to effect blind landings has been perfected by Lieutenant Carl J. Crane, Randolph Field, Texas, flying instructor and noted authority on blind aerial navigation.

Under actual flying conditions the invention has proven successful in both Army and civilian tests.

By simulating radio beams, the newly perfected device is used to work out almost any problem in connection with flying by radio beacon or making blind landings by means of electrical signals emitted from the airport of destination.

Construction of the Instruments

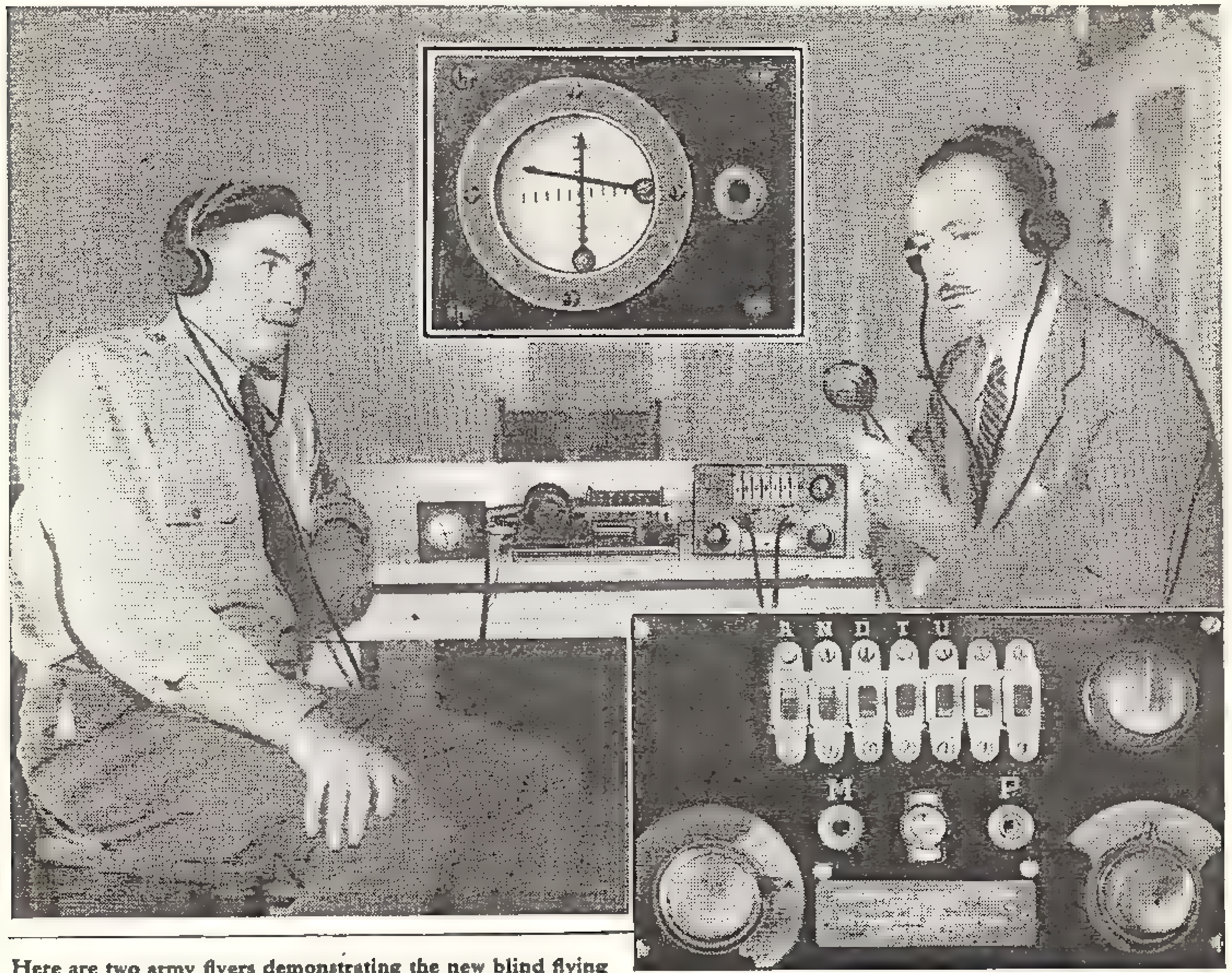
Seated in the open cockpit, the flying instructor has before him a panel (about 5x7 inches) upon which are mounted seven switches and three dials. The instructor and his blind-flying student, who operates the controls of the plane under a sight-tight hood in the other cockpit, are connected by a telephone into which the teacher advises his pupil throughout the course of instruction.

The only instruments necessary for the student are a set of earphones and a small dial with two pointers, swinging from pivots on the right side and the bottom, which cross at right angles over the center of the dial. This indicator is used in training the student in the Department of Commerce method of making blind landings.

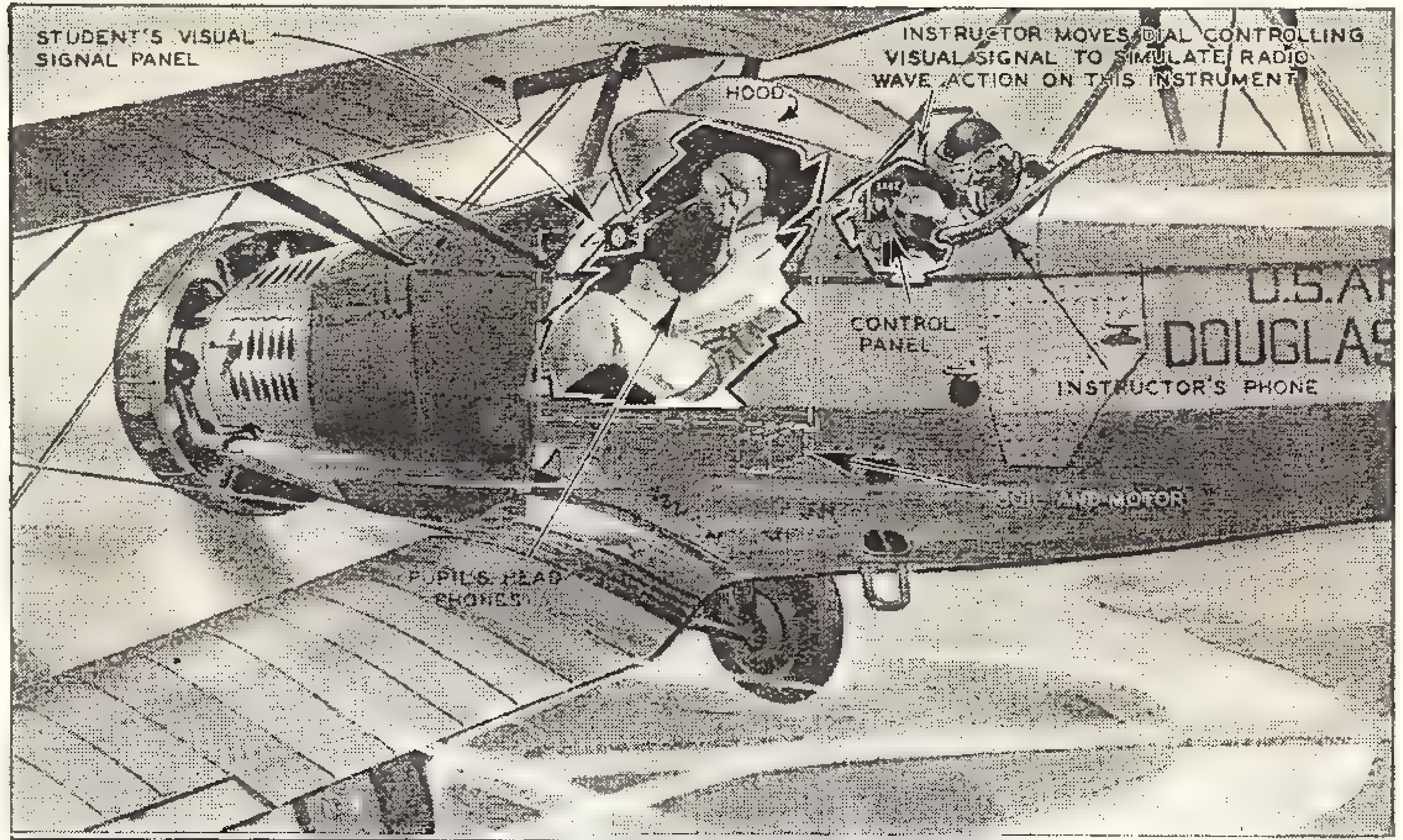
How the Device Operates

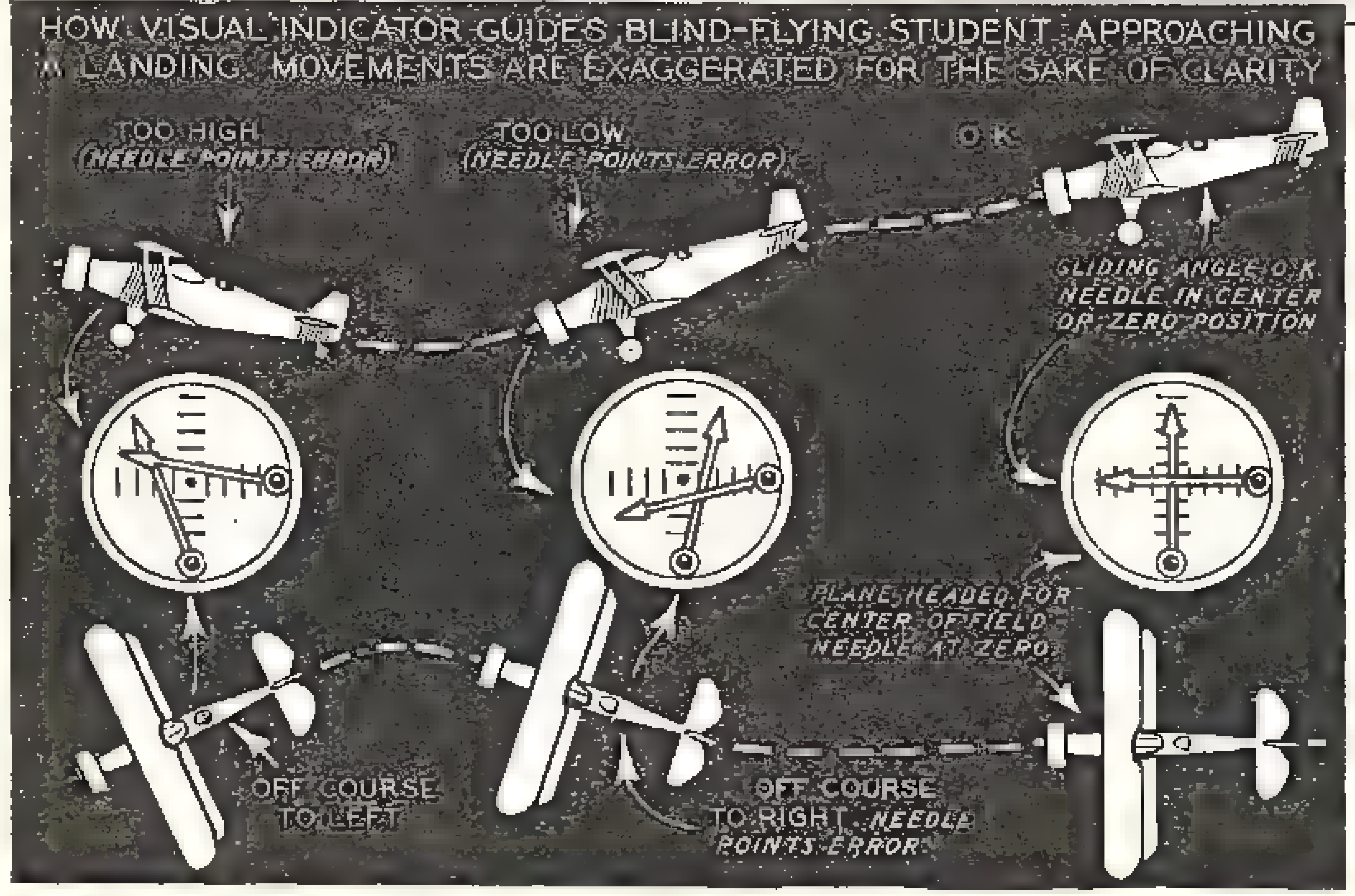
In this method, a system of energized circles around the center of the airport emits radio signals which move the pointers of the dial. The vertical pointer, showing the course, and the horizontal indicator, which points out the "too-high" or "too-low" position of plane, are both operated by the instructor.

"Although blind landings for regular commercial or military planes are still in the experimental stage, it will not be long before all pilots will be able to qualify in the new art, just as they will soon be required to make their mark in flying blind," Lieutenant Crane declared while being interviewed by the MODERN MECHANIX AND INVENTIONS representative.



Here are two army flyers demonstrating the new blind flying instruments. Student (at left) watches dial shown in inset to learn whether he's off course. Instructor at right operates control dial (shown below) to show student direction ship is flying with relation to landing field. Instructions are given through the mike—Photos courtesy U. S. Army Air Corps.


STUDENT'S VISUAL SIGNAL PANEL
HOOD
INSTRUCTOR MOVES DIAL CONTROLLING VISUAL SIGNAL TO SIMULATE RADIO WAVE ACTION ON THIS INSTRUMENT
CONTROL PANEL
U.S.A
DOUGLAS
INSTRUCTOR'S PHONE
COIL AND MOTOR
PUPIL'S HEAD PHONES


HOW VISUAL INDICATOR GUIDES BLIND-FLYING STUDENT APPROACHING A LANDING. MOVEMENTS ARE EXAGGERATED FOR THE SAKE OF CLARITY
TOO HIGH (NEEDLE POINTS ERROR)
TOO LOW (NEEDLE POINTS ERROR)
O.K.
GLIDING ANGLE O.K. NEEDLE IN CENTER OR ZERO POSITION
PLANE HEADED FOR CENTER OF FIELD NEEDLE AT ZERO
OFF COURSE TO LEFT
OFF COURSE TO RIGHT. NEEDLE POINTS ERROR

Artist's drawing above shows how blind flying instruction instruments are installed in cockpit of plane. Student in front is hooded, while instructor sits in rear at control panel. Drawings at left illustrate how dial pointers indicate deviation of ship from course leading to landing field. Student steers plane as if needles were being actuated by energized cables from air field. When the instructor sees the student is keeping on the predetermined course, he throws switch which causes a long dash to sound in ear phones. Should the novice get off course to the right a dash and dot sounds, to left, a dot and dash, until the ship's nose is pointed towards the runway. These signals duplicate those heard from airway radio beacons. Lieut. Carl J. Crane, of Randolph Field, Texas, is the inventor.

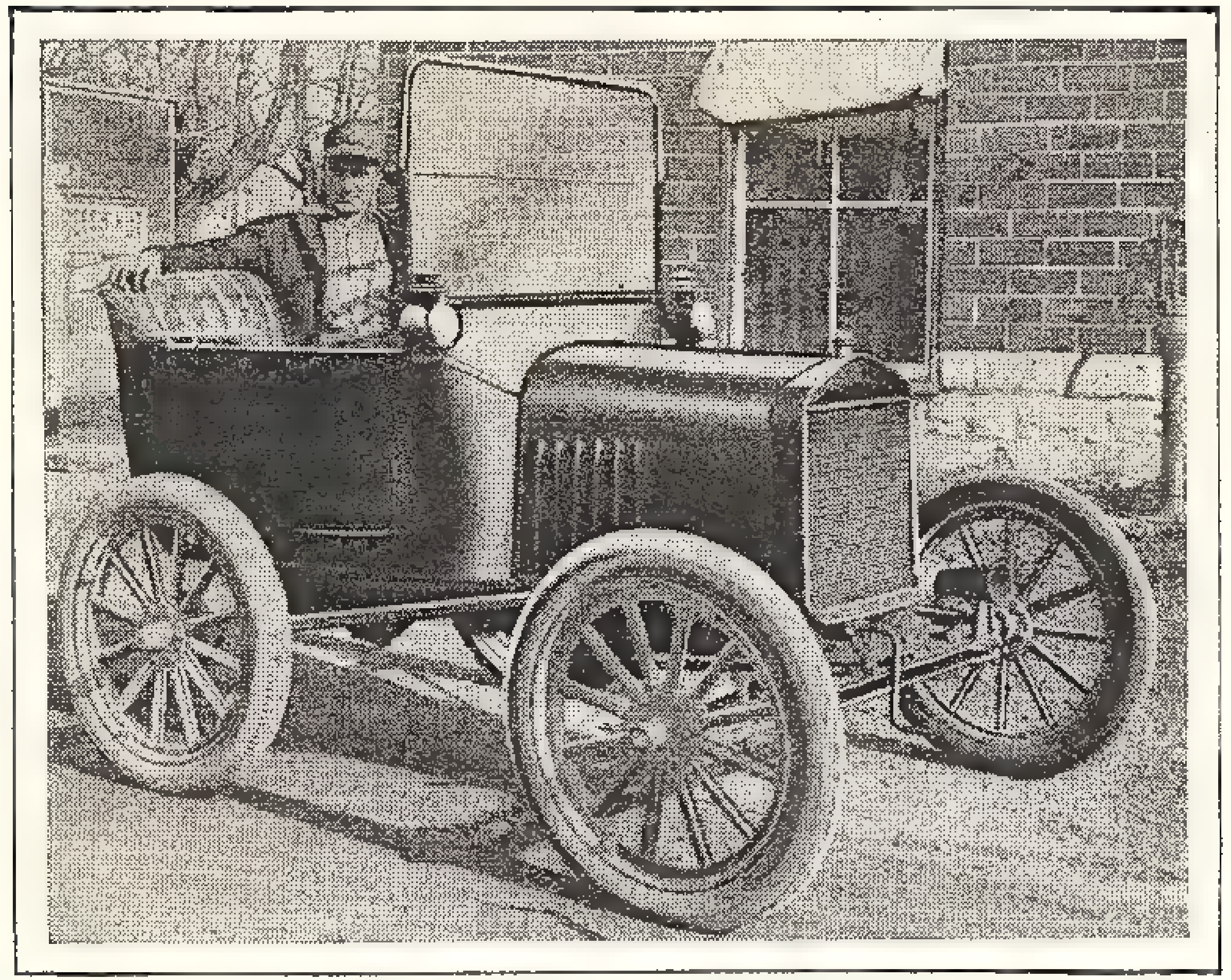
Radio beacon signals, by which the student knows whether he is on the course or to the left or right of it, are also simulated on the Crane Beacon and Blind-Landing Trainer.

When the instructor sees the student is keeping on the predetermined course, he throws the "T" switch which causes a miniature coil operated by a motor to sound a long dash at regular intervals in the pupil's earphones. Should the student get off the route to the right, the man behind the panel in the open cockpit immediately sounds the "N" signal (a dash and a dot) until the airplane is headed back in the correct direction.

Should the plane assume a position left of the prescribed course, the instructor switches on the "A" signal, a dot and a dash, until the ship's nose is pointed toward the "airport." The three remaining switches on the panel also serve to orientate the flyer as he comes in for a blind landing.

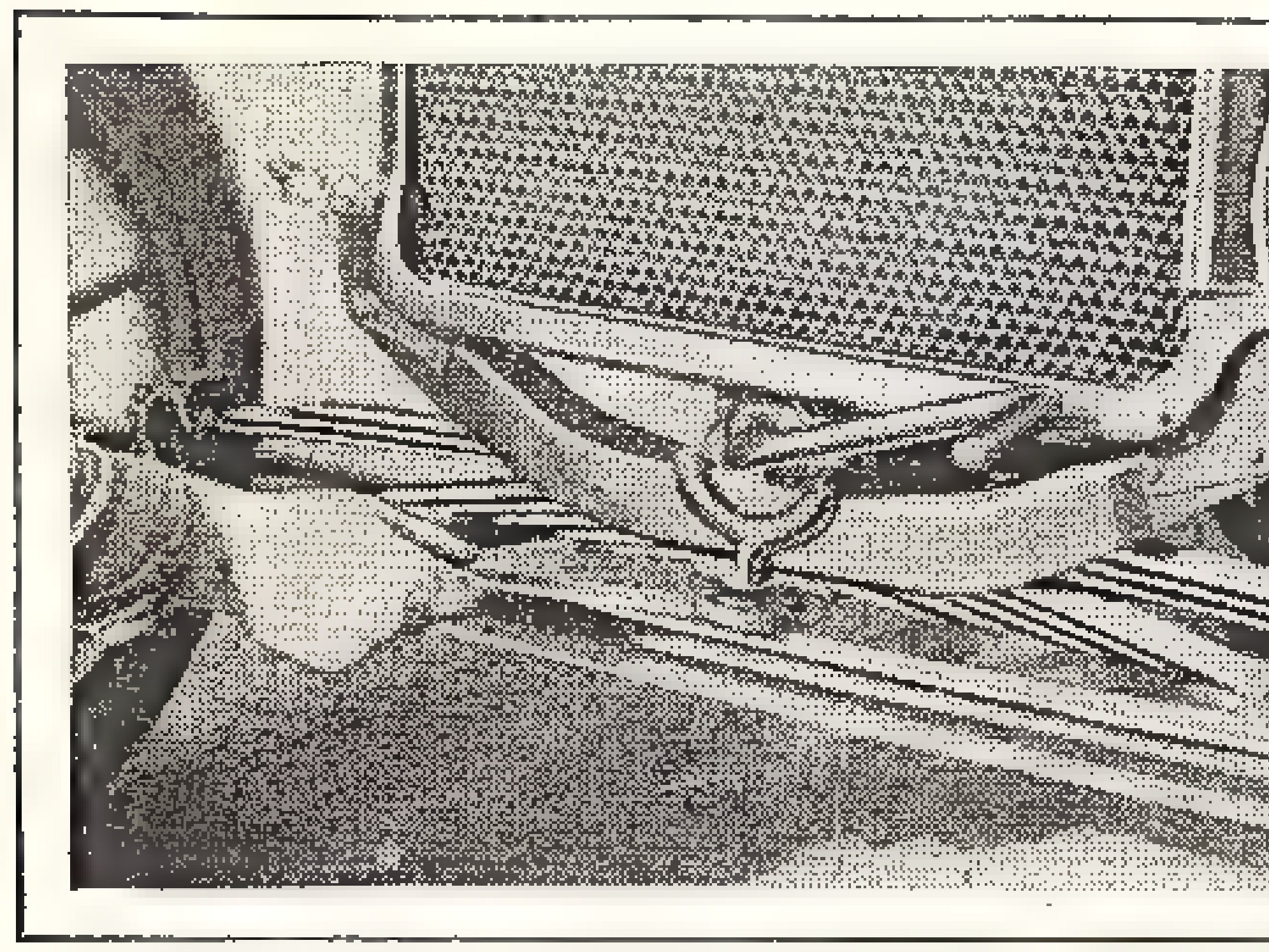
Lieutenant Crane's invention is expected to be hailed by all airport executives as an ouster of expensive ground equipment and to permit blind flying and landing instruction at every out-of-the-way Army and civilian airport.

BUILD a COMEDY FORD

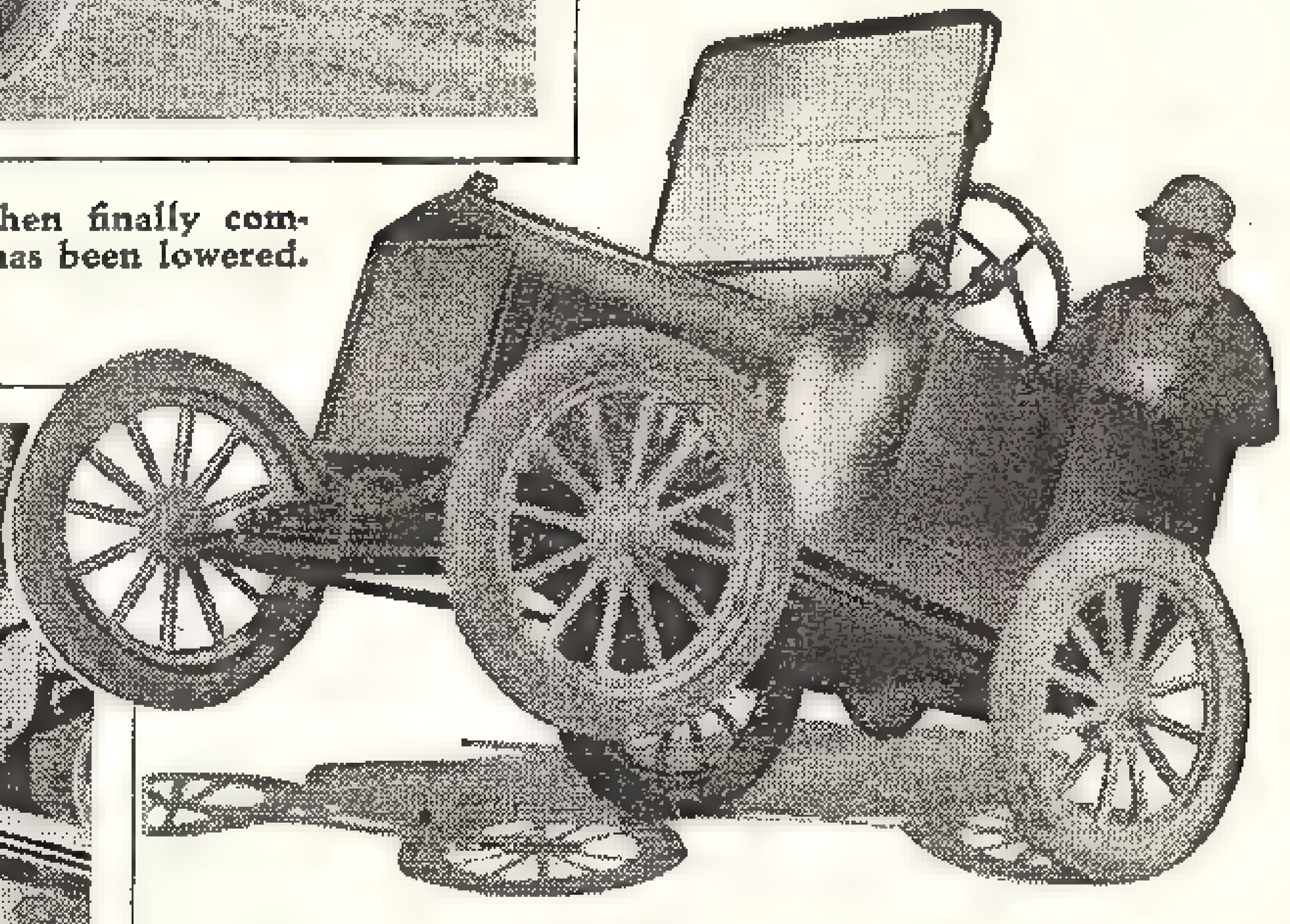


Here's the way the ½ Ford touring car looks when finally completed. The fenders are missing and the whole job has been lowered.

Good money can be made at carnivals and in advertising stunts for local merchants with a sawed off bug made from Model T Ford parts. This article describes the changes that are necessary for making the entire conversion, ready for use.



The top five leaves of the front spring are removed, and inverted. They are placed on the bottom of the spring pile. This lowers the car forward (leveling with rear axle) furnishing a stout shock absorber so that—



—when the car is suddenly started and the front end rears up the lowered and inverted forward spring leaves act as a strong absorber for drinking up the dropping shocks.

AN ATTRACTION that is sure fire always makes a good advertising medium. This converted Model T Ford, or Comedy Ford, can be very easily built, and is a profit maker for any man who has a little ingenuity in selling its uses.

It can be used to carry labels, or to give thrilling joy rides about town, or to provide a freak set of thrills on any country fair race track.

By this conversion the center of gravity of the car is brought so near the rear axle that with two men in the little buggy it can be made to run for quite long stretches on the two rear wheels. Sudden starting makes the front end rear up and act jack-rabbity.

The size and odd appearance of the car make it the center of attraction, and really difficult problems in parking are so amazingly easy that much comedy is given to all onlookers. Like Charlie Chaplin, the car is funny just to look at.

The elements from which this car is made are simple.

You'll need one usable Model T Ford touring in running condition. Remove the body and cut it in two with tin snips right behind the front seat.

That is step number one.

Next, remove the rear wheel assembly, axle and all, and discard the spring and shackles. Then move the axle forward, and weld in a short piece of drive shaft in place of the long one just discarded, seeing that the end of the universal housing and the bearing on the axle are as close together as it is possible to get them.

Pillow blocks of 2" by 4" stock are placed between the frame and the axle on both sides of the frame, and long U bolts of ½" cold rolled steel are bent and threaded and a clip plate fashioned so that the axle may be bolted to the frame.

Then the frame is hack sawn off right "abaft" the hold down bolt holes for the body.

The radius rods are separated and the ends welded to the sides of the frames.

That completes the rear end.

The front end is very simple, needing but few changes. The main idea is to get the whole frame lowered so that it is more on line with the springless rear wheels. Since the rear wheels are now carrying more of the load than the front, the spring forward can be much less strong and still be plenty heavy. The first five top leaves are removed and inverted, and then placed in the bottom of the spring pile. Thus when the car smacks down to earth after one of its spectacular "rarin's," this inverted spring cushions the shock.

The exhaust is led out through an extension of flexible metal hose.

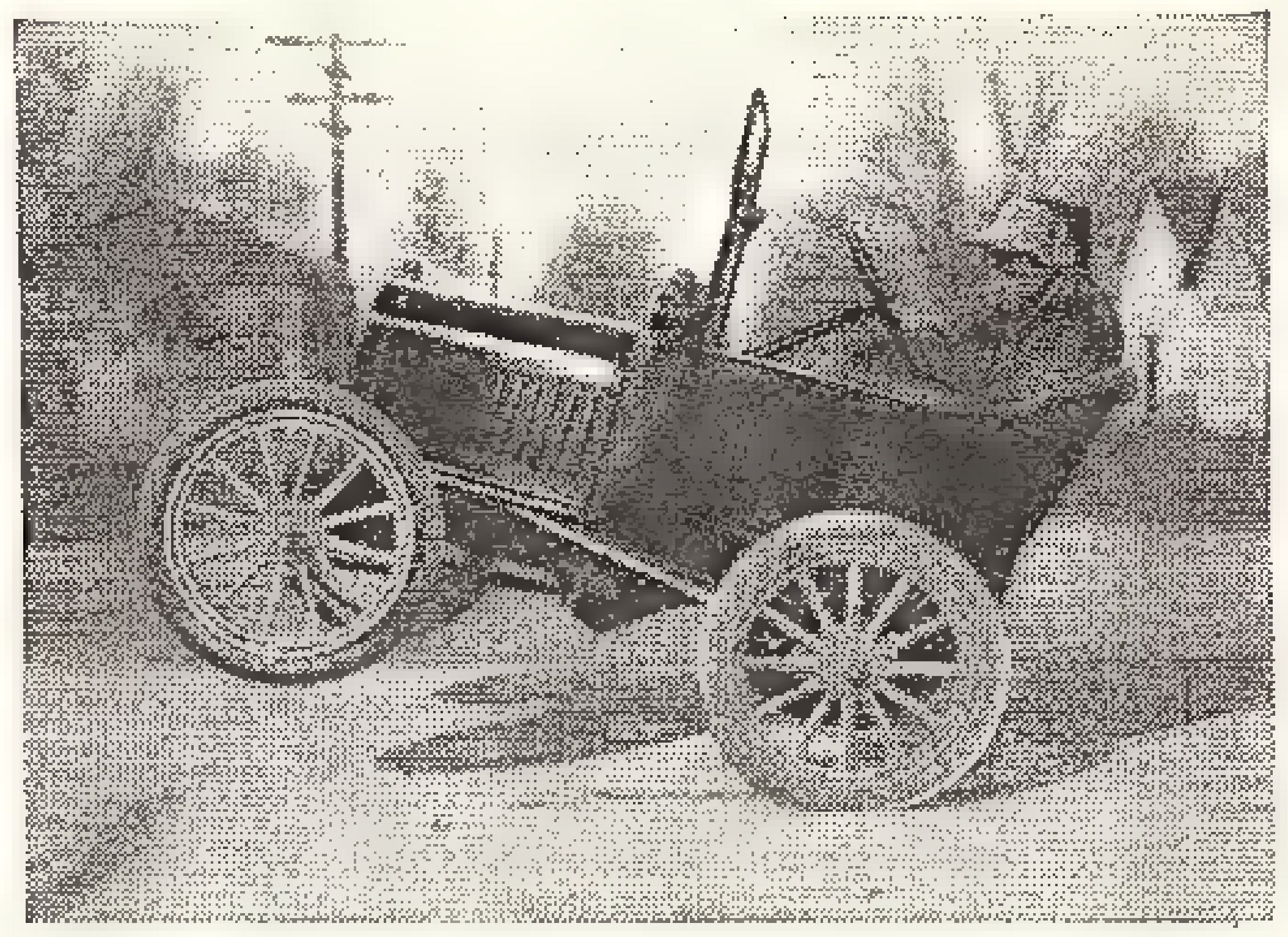
The body is put on, and bolted down.

The matter of marketing the services of the car is not difficult.

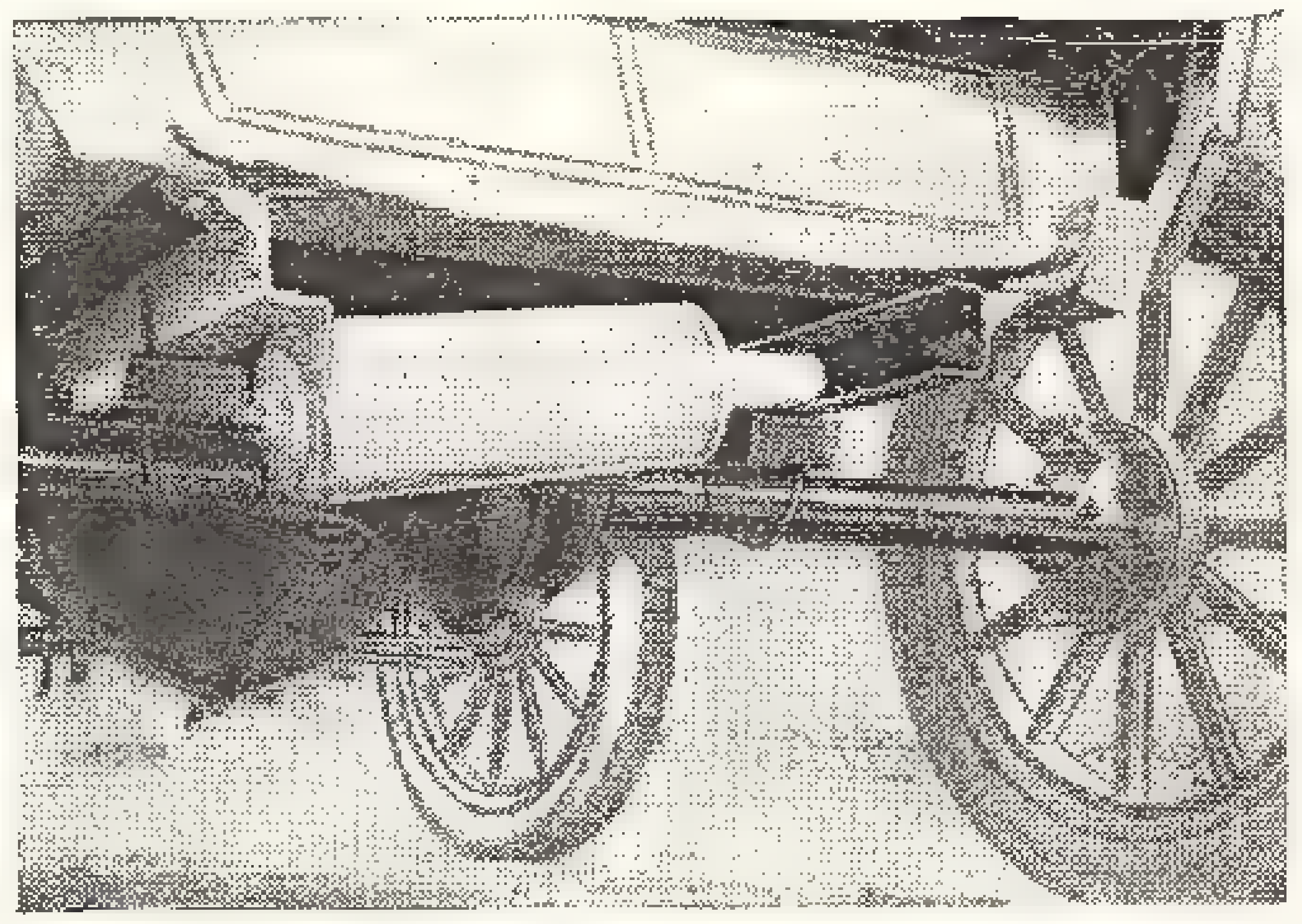
A call to local merchants will soon show you what they are willing to pay for a sign of a comic nature on your car, and by changing the car's literary cargo each week, you will keep the turnover steady.

A matter of giving "jitney" rides is a simple affair in most cities. Put a sign on the car, 5c a ride, and show it doing some of its bucking tricks. Several dollars a day can be earned in an active, well populated community.

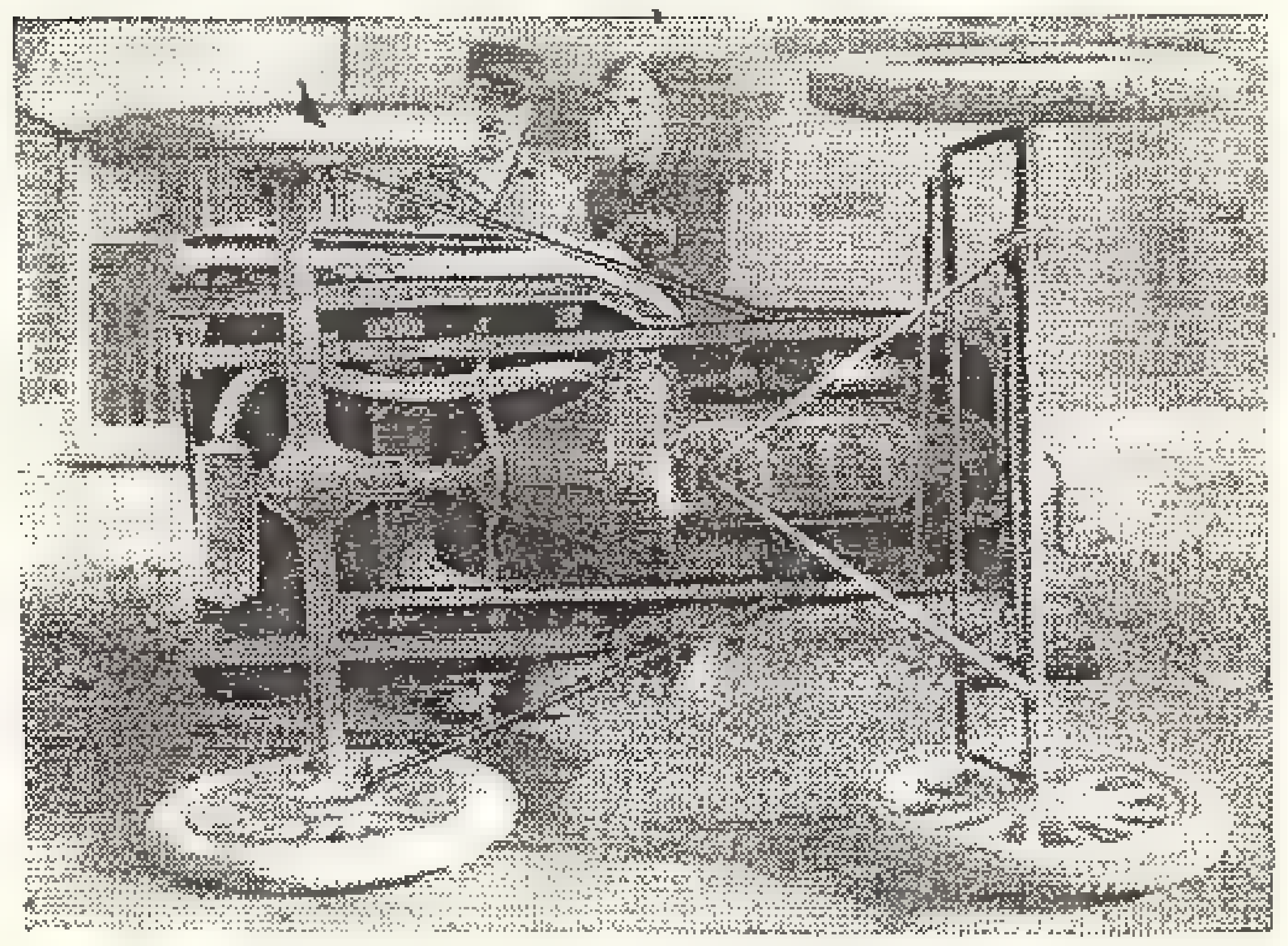
County fair concessions can be ascertained by writing the state bureau at your state capital, through the secretary of state.

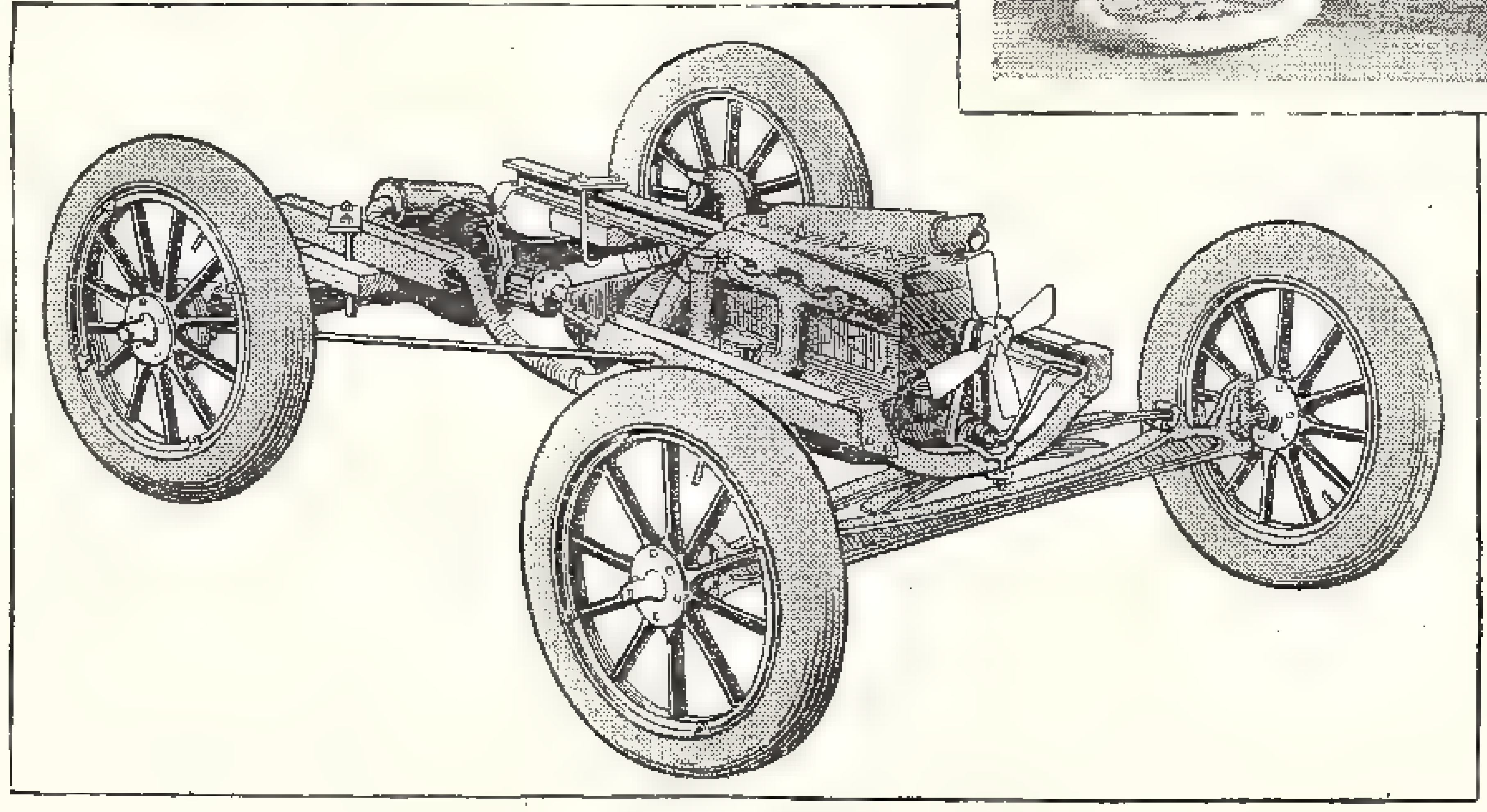


The center of gravity is so near the axle that when car suddenly starts the front end goes jack-rabbity.



The photo above shows the muffler tucked in at right angles, U bolts over rear axle, and sawed off frame.

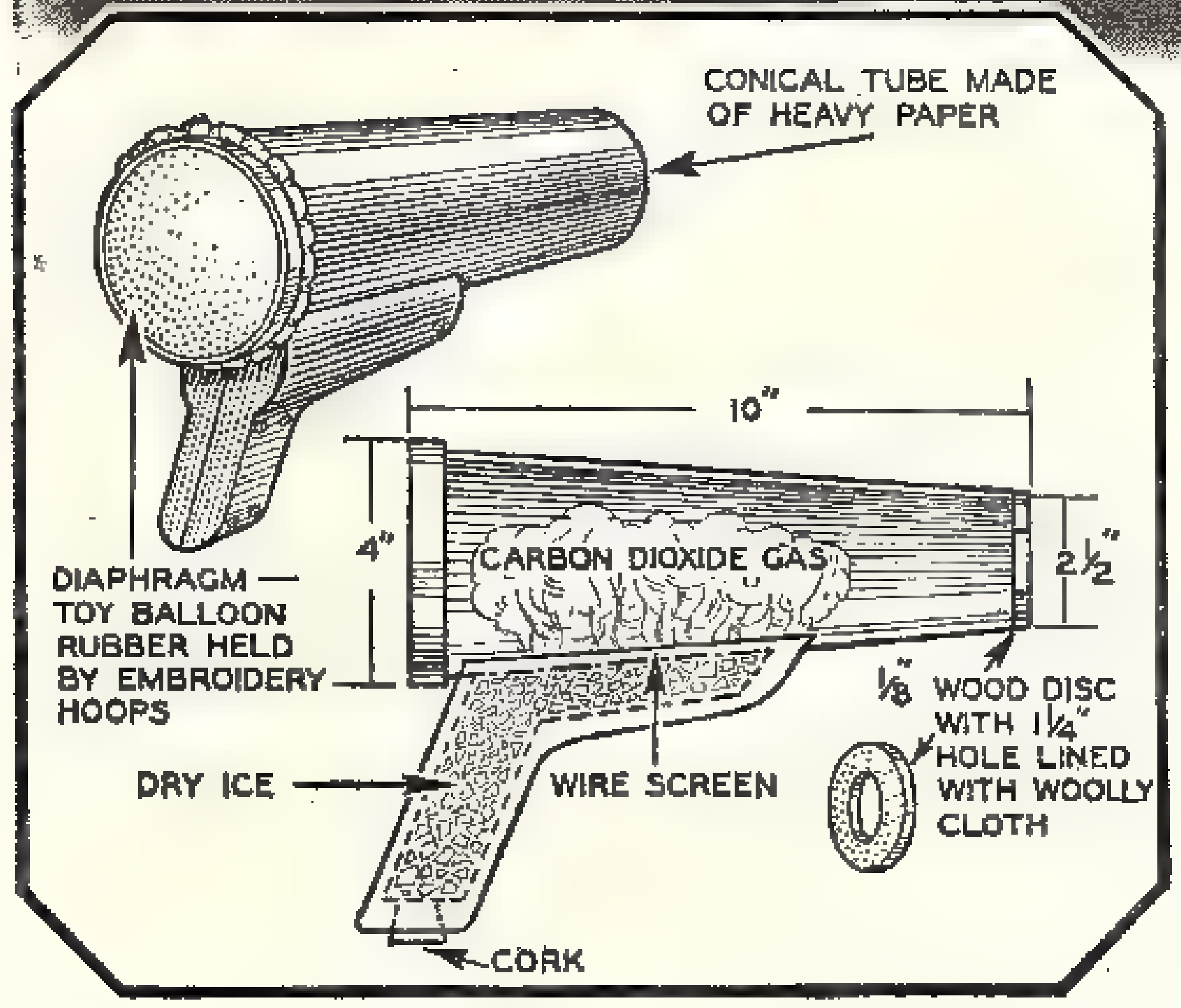




Showing dropped front end with spring pile reversed, U bolts holding axle to frame, and exhaust.

Above is shown the way the rear axle is moved up against the universal joint on the motor and how the radius rods are led forward to the frame. Left, how pillow blocks and U bolts fasten the axle to the frame. No rear springs are used. Flexible metal hose is used for exhaust pipe. Radius rods are welded to the frame alongside the motor. The body is bolted back on the frame. The floorboards and all present equipment will fit the altered job.

Bring "Ghosts" to Your Home for WINTER PARTIES


CONICAL TUBE MADE OF HEAVY PAPER
10"
4"
2½"
CARBON DIOXIDE GAS
DIAPHRAGM — TOY BALLOON RUBBER HELD BY EMBROIDERY HOOPS
⅛" WOOD DISC WITH 1¼" HOLE LINED WITH WOOLLY CLOTH
DRY ICE
WIRE SCREEN
CORK

Construction of gun which shoots invisible, clammy rings of ice-cold carbon dioxide gas, which feel like ghostly hands.

The author demonstrating how the gas rings travel. Incombustible carbon dioxide is here extinguishing candle flames.

by RICHARD COKE

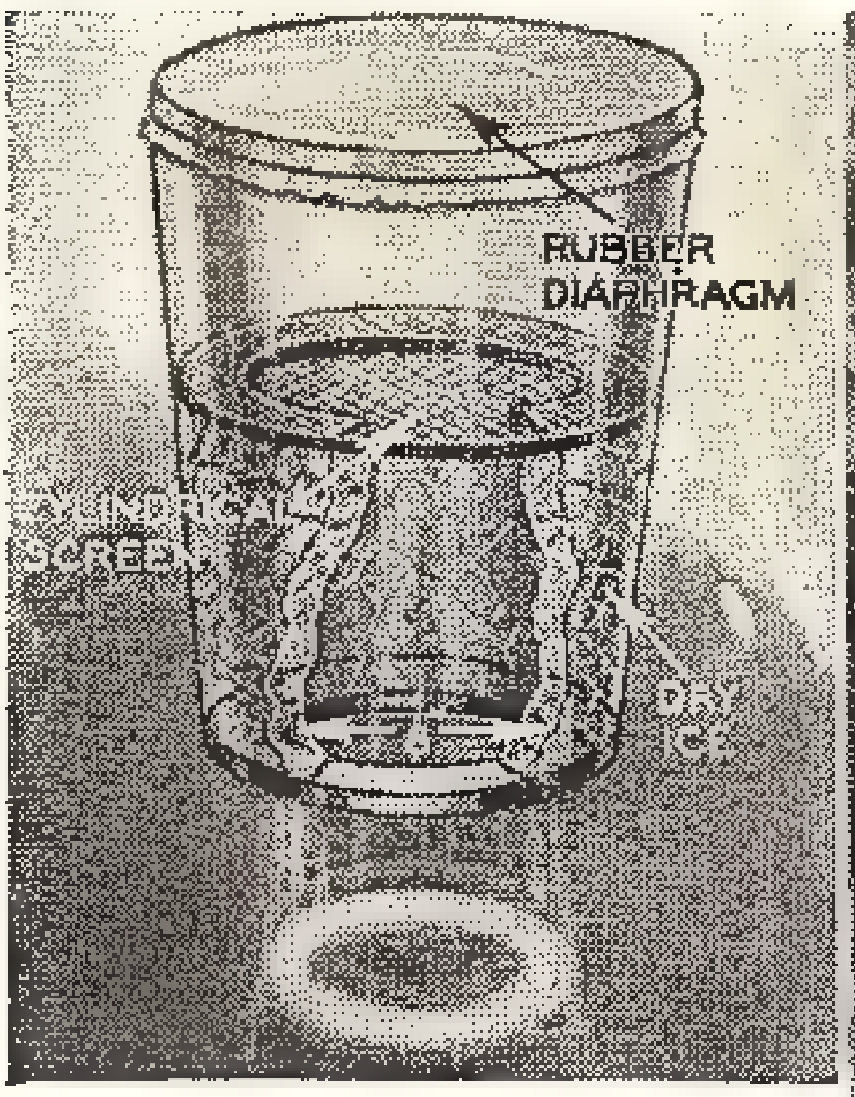
The author's adventures as a "ghost detective," ferreting out the secrets of fraudulent mediums, led him to the discovery of the ingenious methods of creating phantoms which he describes in this article. Using these simple stunts, much fun can be had at house parties, and you can easily convince your guests that you are in private communication with the supernatural.

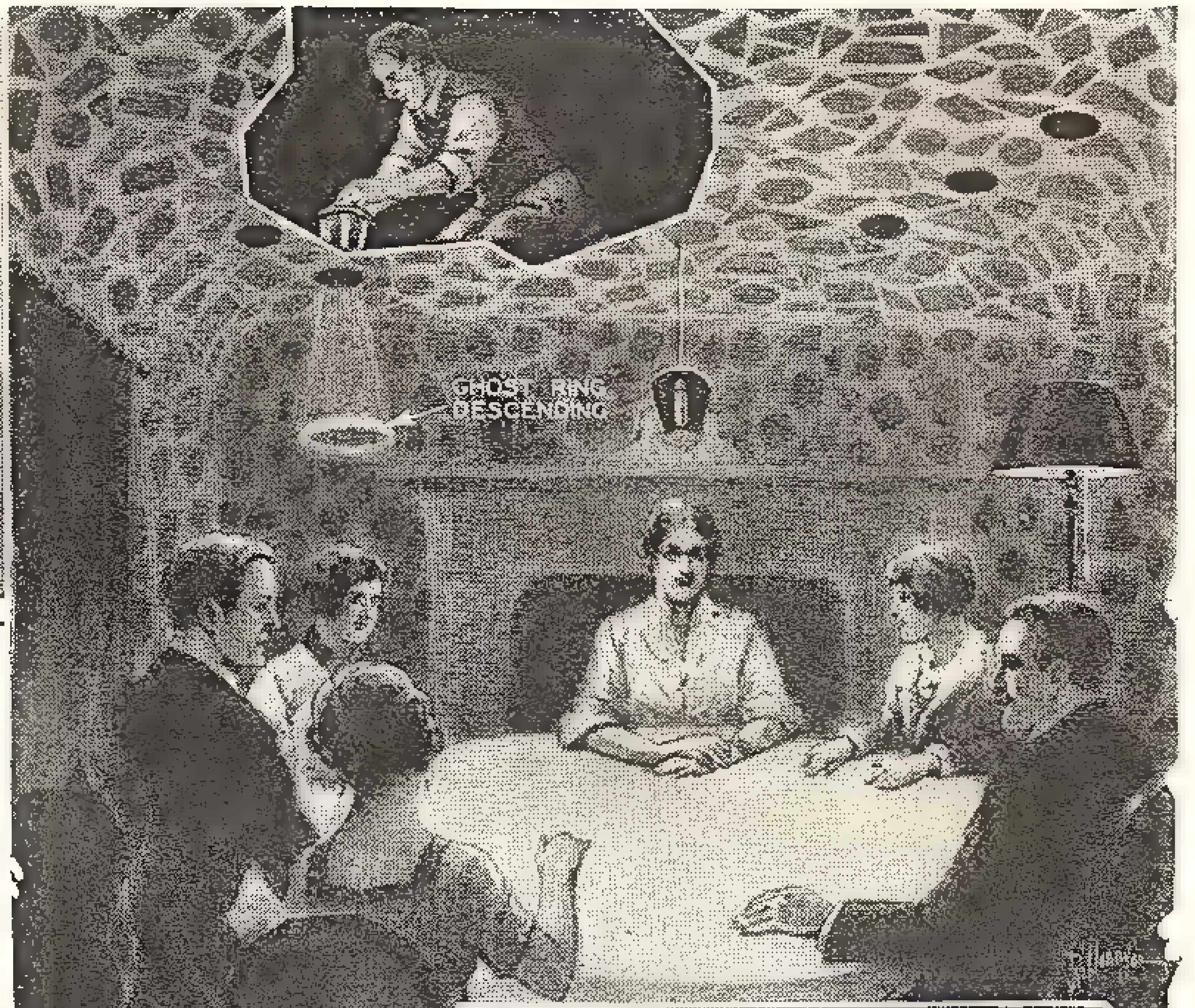
WHEN Eddie called me up from the *"Times"* office, and asked me to come along to Madame Y's "Wednesday night circle," of course I accepted the invitation. For over fifteen years I've been spook hunting, but with no *material* success. When spooks have rattled tin cans in a cabinet in imitation of a "Model T," I've always found that the spooks had bone and muscle. When nebulous images have appeared on photographic plates, I have always found the foggy patches due to exposure to X-rays, radio-active salts, or maybe to a tiny pin-hole in the bellows of the camera.

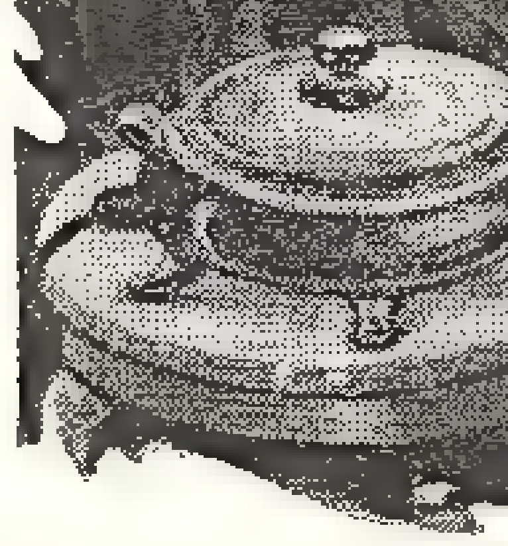
Eddie is a reporter on the *"Times."* Nosing around for copy, he had visited Madame Y's the week before. What he had seen had him absolutely mystified, so he got in touch with me to see if I could dope it out. He declared that ghosts were all over the semi-lighted room; actually brushed against him, enfolded him!

We arrived at Madame Y's. It was a big, gloomy, frame house out on Santa Monica boulevard. It was a few doors from a cemetery. I couldn't help but think that "Madame" was a good business woman: she kept her ghosts close at hand to avoid cross-town taxi fares.

At the door we encountered the usual "spirit seance" atmosphere — a dark-skinned, loose-robed confederate, who admitted us and ushered us into a big room decorated after the motif of grandma's crazy quilts. The ceiling met the walls in a sweeping curve. Both were painted, in a variety of sizes, with the three most common geometric figures: circles, triangles, and squares.







Above, a gas ring mortar of the type used by the fake medium. Layout of Madame Y's seance chamber is shown at right; chafing dish dispenses vapor which supplies humidity to make visible the cold gas rings sent into room by confederate upstairs. Geometric patterns camouflage openings in ceiling.

A fairly wide table about ten feet long, and covered with a green cloth, was located in the middle of the room. There were six straight-backed chairs at each side of the table, and two at one end. At the other end, on a slightly raised platform, was an armchair—the "Madame's." I noted particularly that the chairs, and all the woodwork about the room, were finished in dull green and offered no reflecting surface.

The lighting effect was very unusual. Above the table, and about two-thirds the way between the floor and the ceiling, was a long, green, neon light tube. A semi-circular shield above the tube cut off all the upward beams of light, but diffused the lower part of the room with a sickly, green glow. Before the actual "seance" started, several floor lamps about the room were alight with conventional white bulbs.

On a small table in a corner near the "Madame's" chair, was what appeared to be a re-designed electric chafing-dish—I noted an electric cord leading to the device. It was emitting a spicy-smelling vapor. The atmosphere in the room was very humid, oppressive.

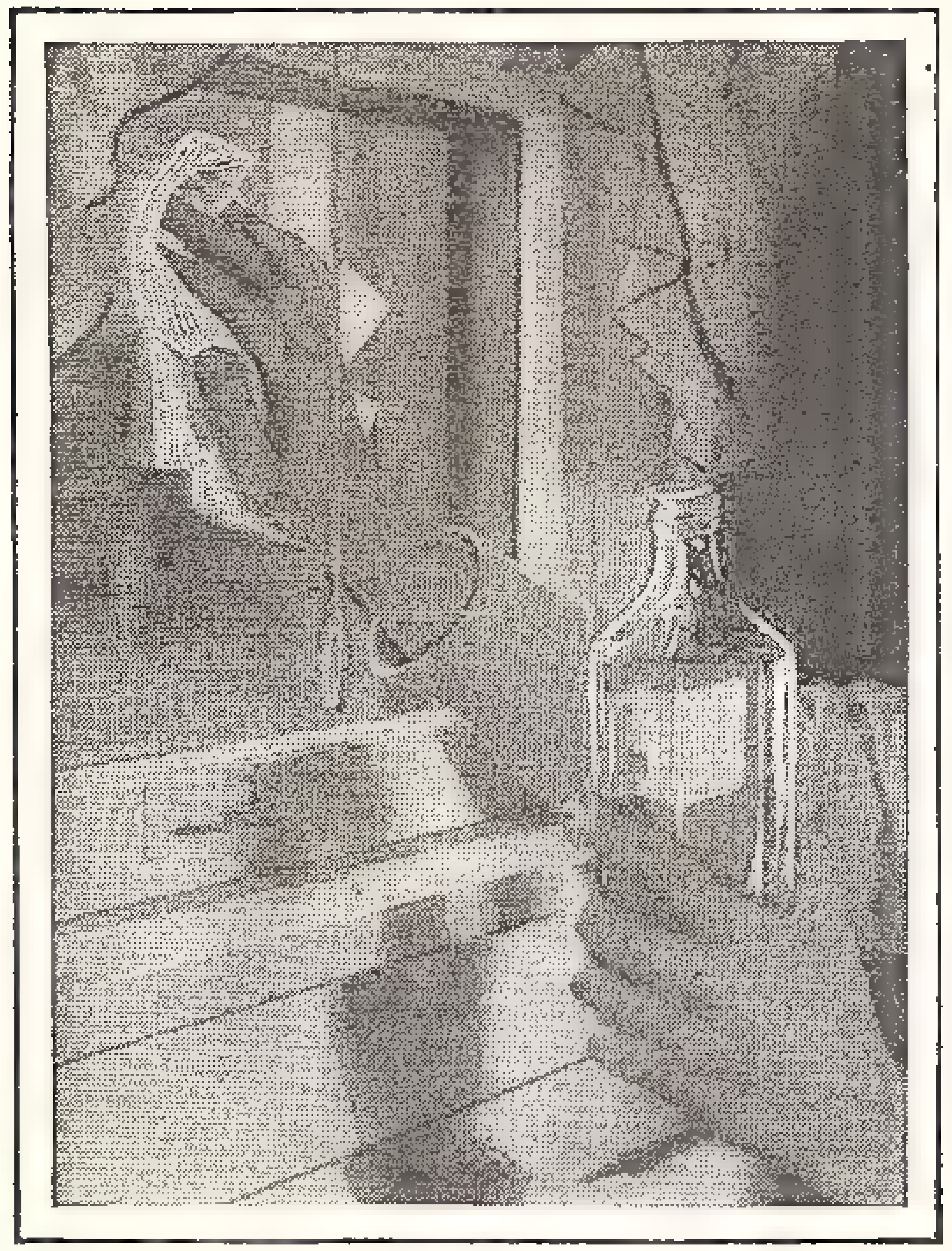
Demonstrating how the gas ring mortar sends a halo of dry ice generated gas settling over the shoulders of subject.

So much for the physical surroundings. There were about ten persons in the room, mostly women. Also two half-baked-looking males. (Not including Ed and me).

Suddenly an awed silence. "Madame" swept into the room with ill-cultivated grace, and wedged her portly form into the armchair at the head of the table. The "circle" was called to order. The word "circle" struck me kinda funny. Why not call the meetings the "Wednesday night rectangle?"

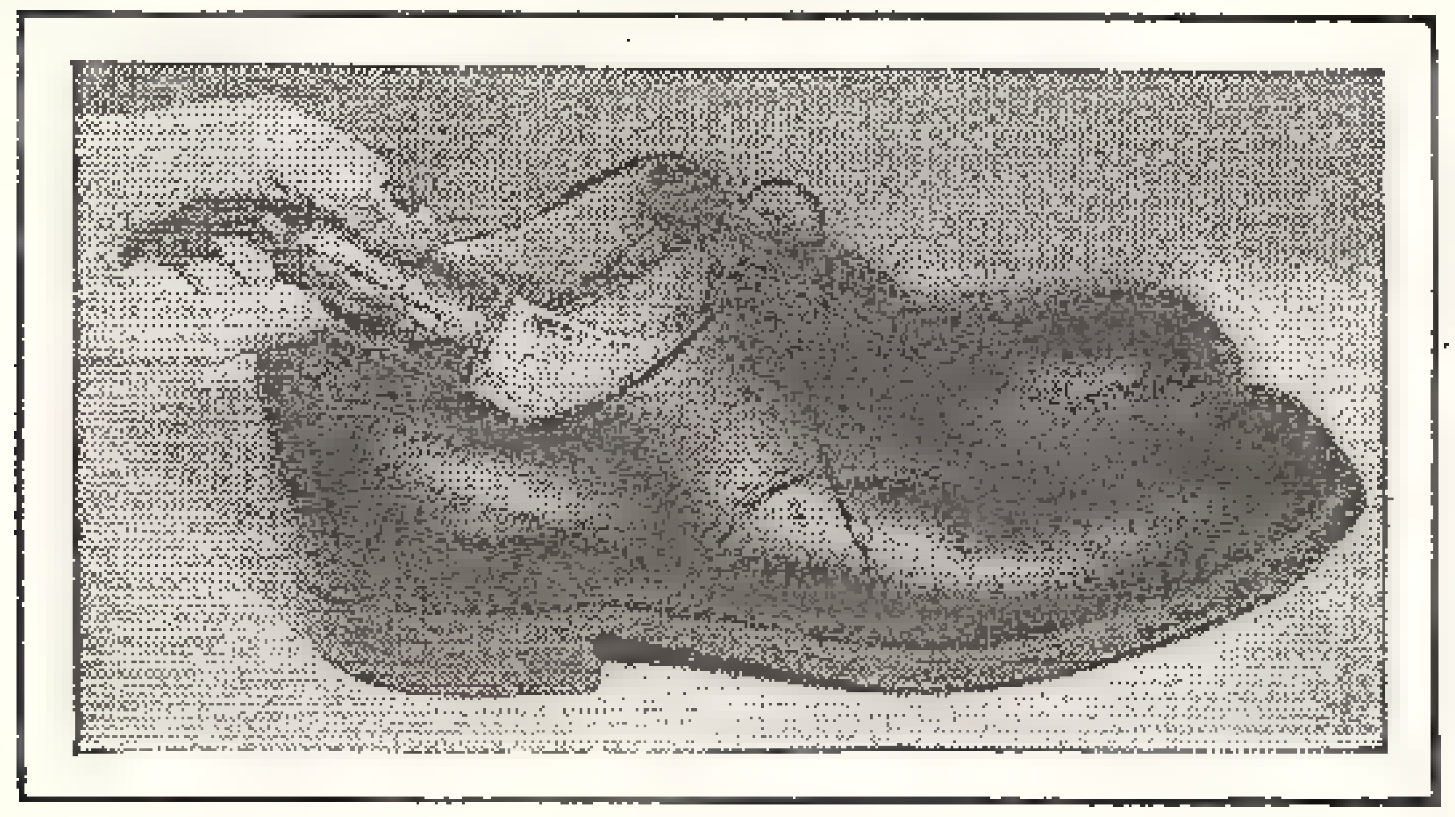
After we all were seated, "Madame" went through a lot of superfluous palaver, lead-

HELPFUL IDEAS for the HOME FIX-IT MAN



Non-frosting Windows

With winter upon us, the seasonal necessity of enduring frosted windows or those which steam up when cooking is done is with us again. This annoyance can easily be done away with by purchasing twenty-five cents' worth of glycerine from your drug store. Apply this to the glass with a rag. The thin coating it leaves offers no surface for moisture to accumulate upon.



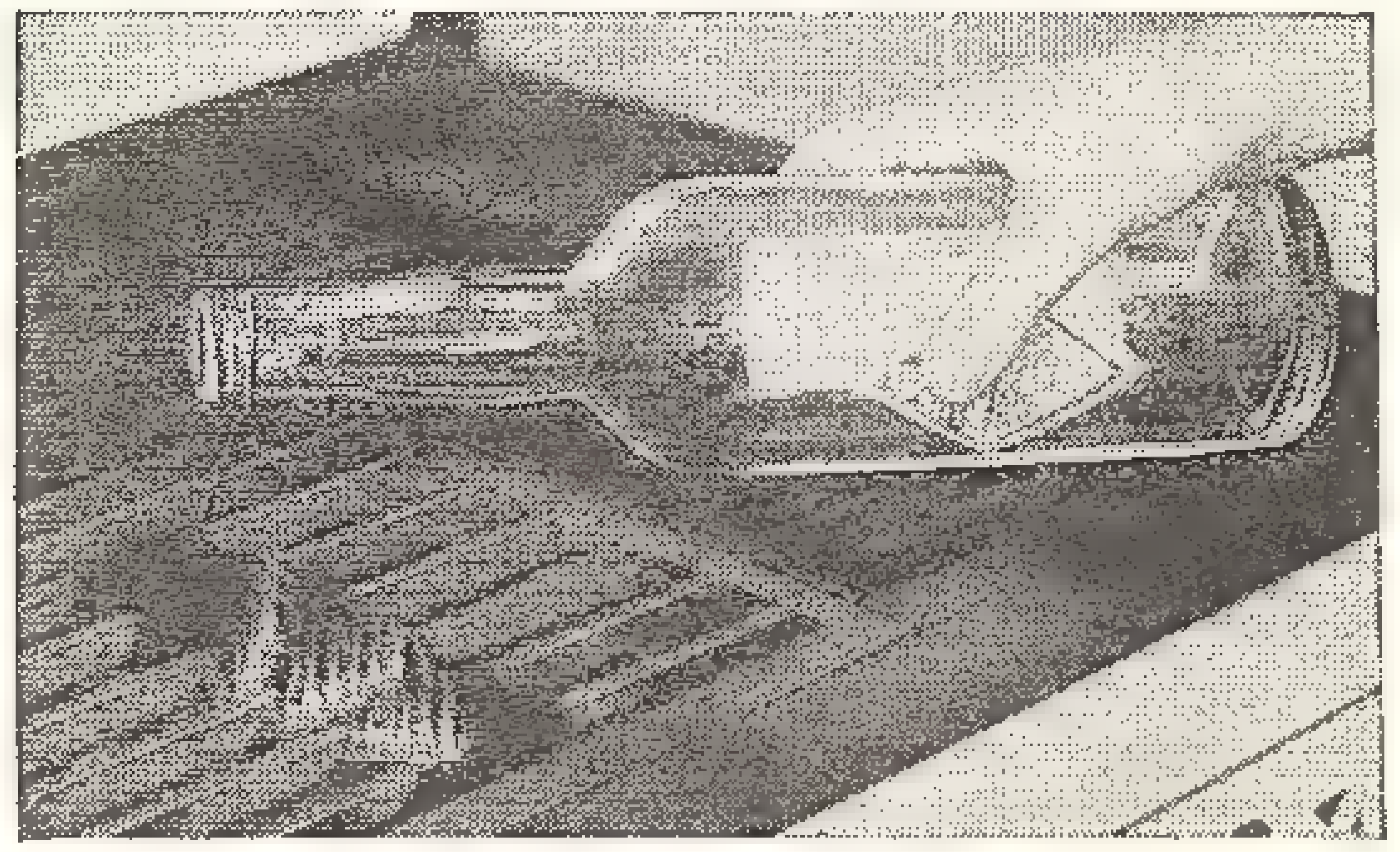
Drying Shoes With Light Bulb

Wet shoes should be dried from the inside rather than by baking in a hot oven, which always results in such damage to the leather that its useful life is cut short, though the owner may not be aware of it. A ten-watt electric light bulb placed directly inside the shoe, as shown above, makes an excellent drying medium. Higher powered bulbs should not be employed, for they dry out the leather too quickly, with deleterious results.

Repairing the Gas Range

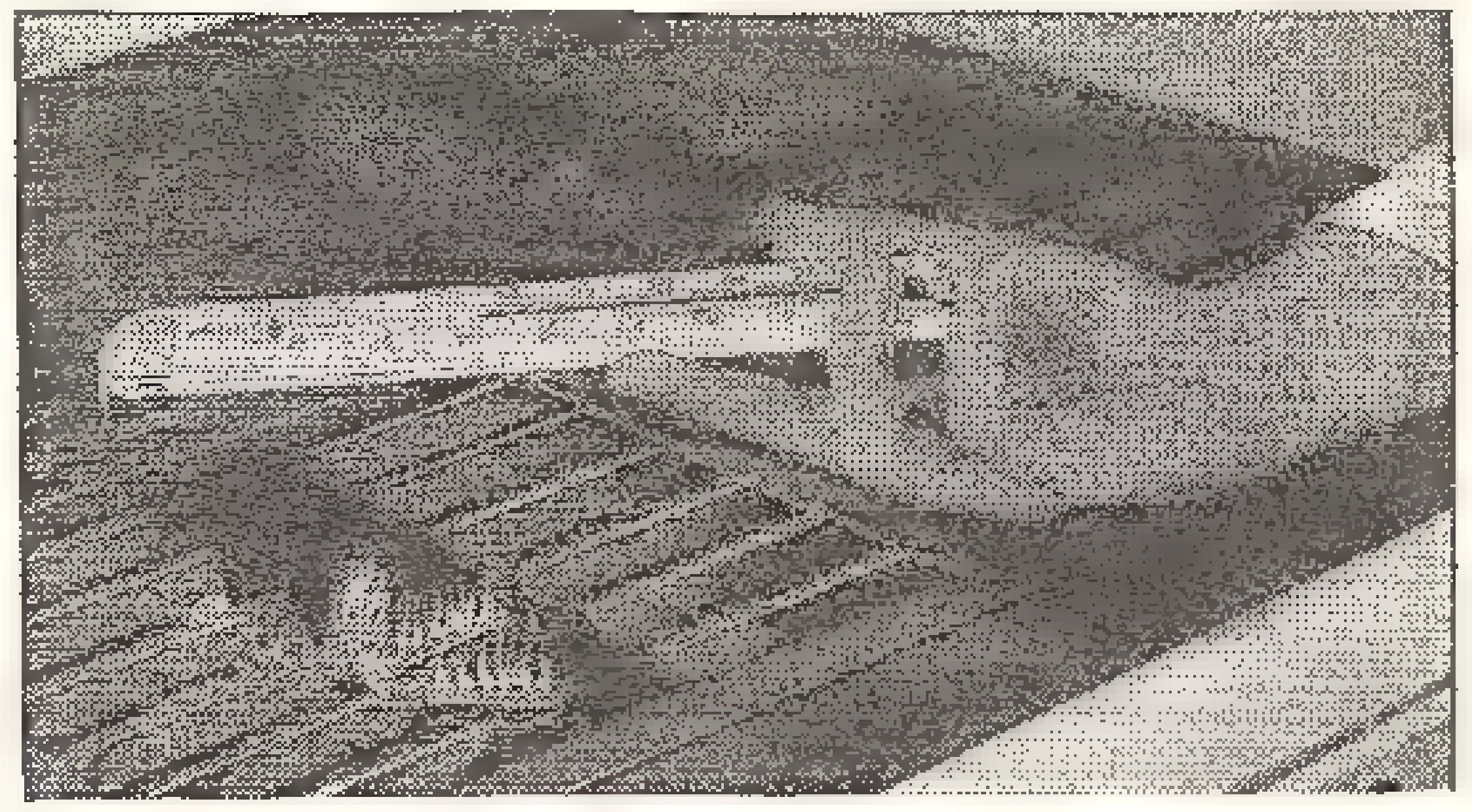
Cleaning gas burners generally restores the efficiency of the kitchen range. The burners should be removed, carefully brushed and scraped, and darning needles run through each small aperture. Then the burners should be boiled in sal soda. They should be carefully dried by heating before returning to place.

If the pilot light on your gas range gives continual trouble, cut a hole about three-quarters of an inch across in the top of the cap which covers the pilot. If you suspect a gas leak in the house lines, make sure that all gas cocks are turned off, then watch your gas meter. If any of its hands move, begin looking for the leak.



Removing Glass Stoppers

This method of removing stuck glass stoppers from bottles is one of the most efficient known. A heavy copper wire is wound around the bottle at the point of the stopper, and a long end left to dangle in a gas flame. Heat will flow along the wire and expand the bottle neck so that the glass stopper falls out easily.



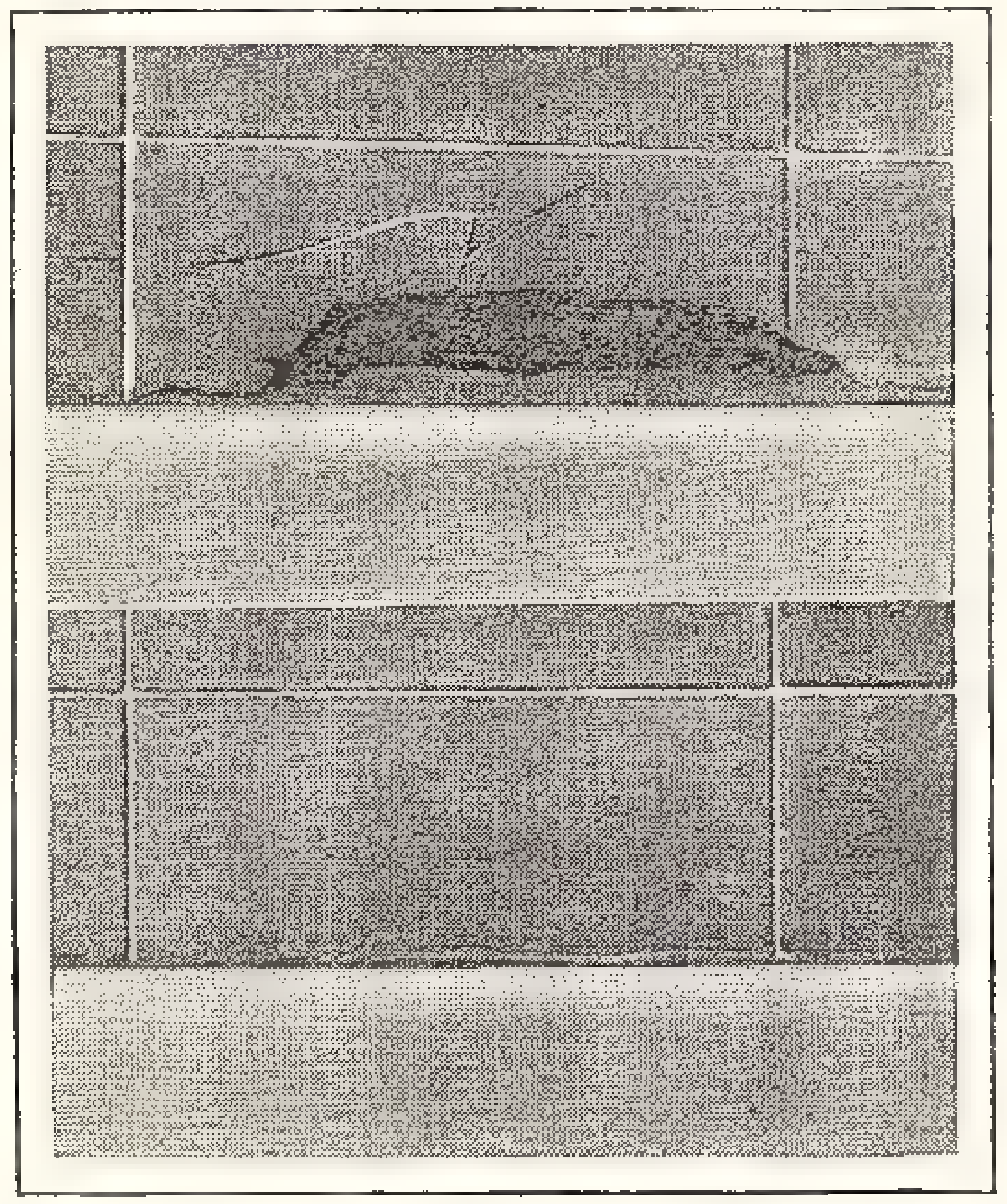
Easy Thermometer Repair

Through mishandling, the mercury column of a thermometer sometimes becomes separated. By heating the stem of the thermometer gently over a subdued gas flame, and striking the instrument end-on against the palm of the hand, the broken column can usually be reunited.

For Frozen Pipes

If you have a water pipe that freezes in extremely cold weather, try covering it with felt, asbestos, or cork; then allow a small stream of water to trickle from a faucet near the danger section, to keep up movement in the pipe.

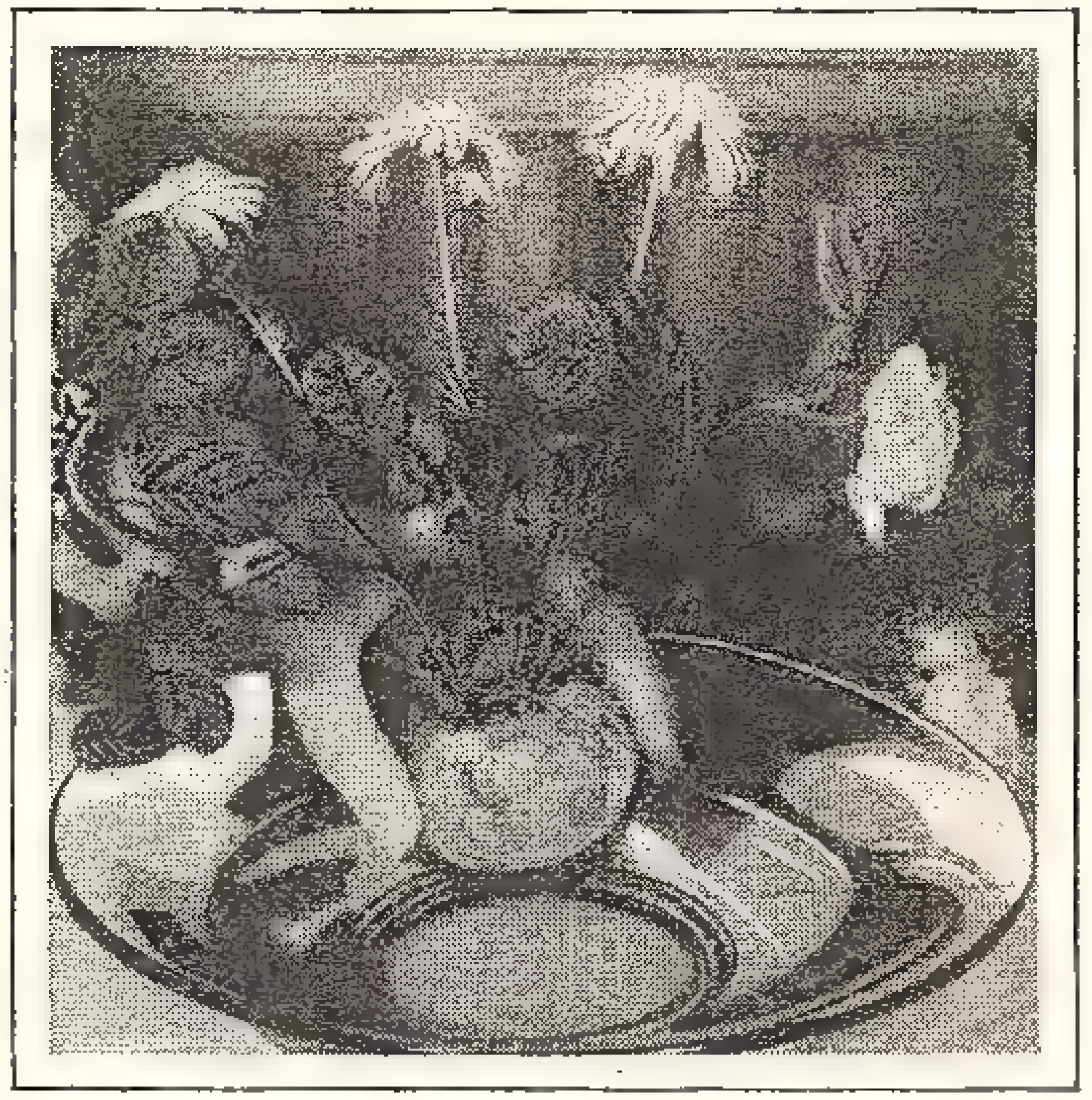
If pipes are found frozen, prepare to shut off water pressure if a fracture is discovered. Then warm the pipes from the faucet end with a small blowtorch or other heating element. Heat applied should be gentle and should not be concentrated on one section of the pipe, but moved gently back and forth. Burlap sacking wound around the pipe and saturated with hot water is effective. Sometimes a candle gives sufficient heat. Be careful not to set fire to adjacent woodwork.



Plaster Repair Kinks

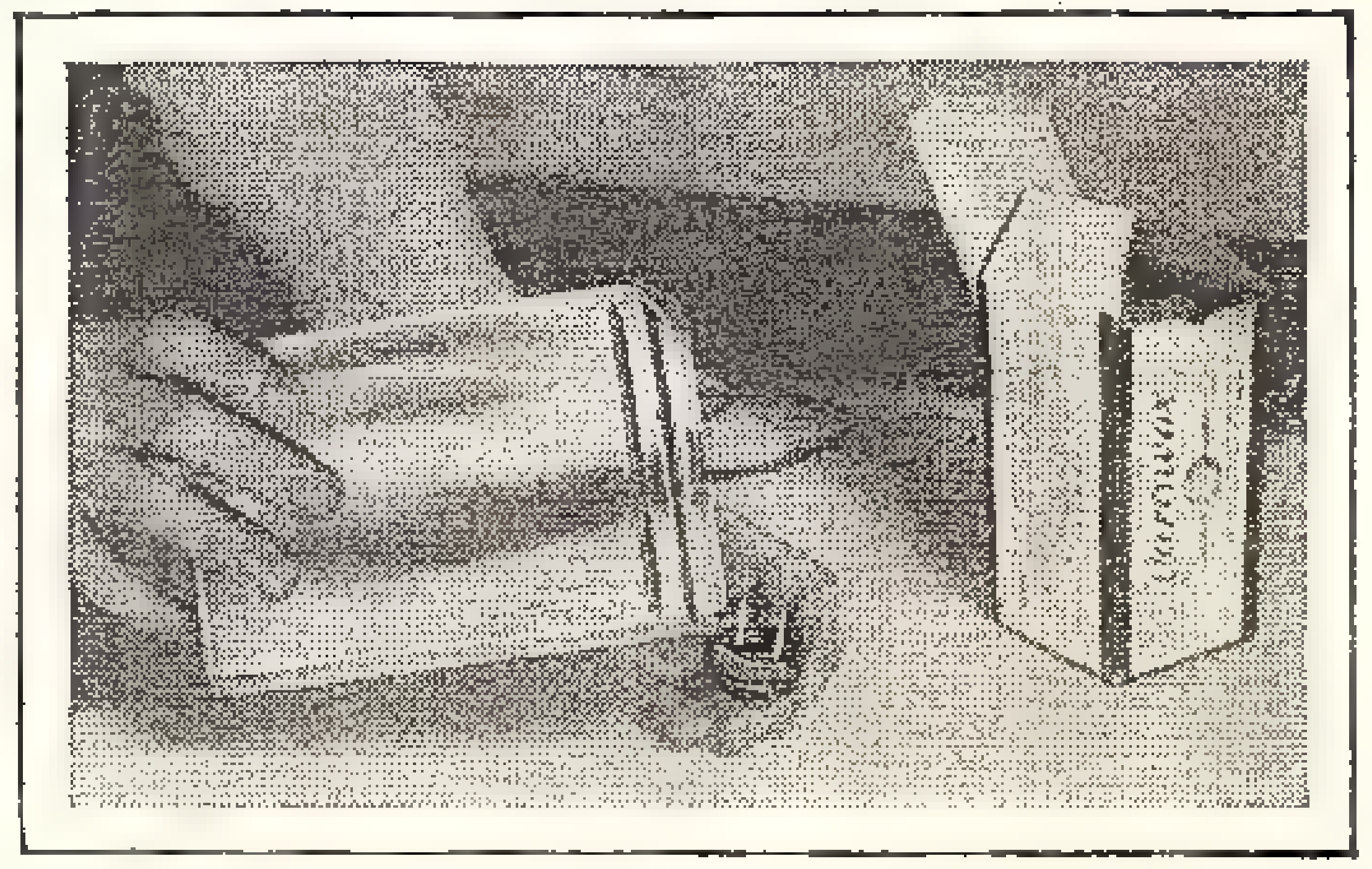
Broken plastering is one of the most common ailments of the interior finish of the home. The upper section of the above photo shows a crack in a tiled wall along the edge of a bath tub. The lower section shows the same spot repaired with a filling of plastic wood, which was smoothed into the opening, permitted to harden, and then coated over with a layer of enamel to match the wall. Because it is already mixed plastic wood affords a quicker repair to such breaks than regular plaster.

Every home has various accessories mounted to the walls by screws, which frequently pull out, leaving a ragged hole in the plaster. Plastic wood can be used to fill up this hole, leaving a solid base into which the screw may be forced, or a wooden plug can be driven in and screw reset.



Vegetables Preserve Flowers

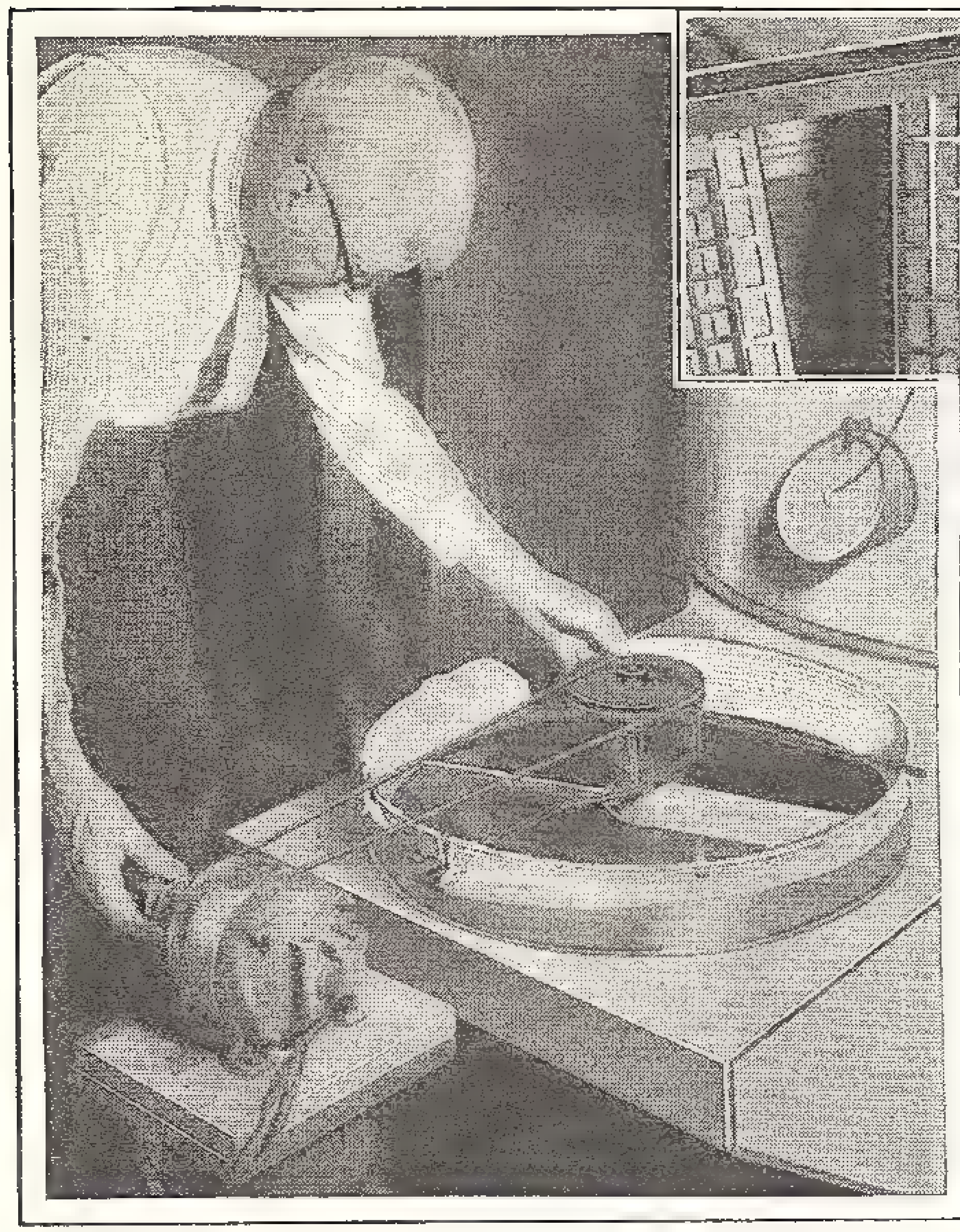
An old method practiced in New England for the preservation of cut flowers is to mount them in a good-sized fresh potato, cucumber, beet, or other solid vegetable. A sharp lead pencil or pointed instrument is used to punch one hole in the vegetable for each flower stem, which is inserted therein. The whole is then set in a vase with water sufficiently deep to cover the base of the stems. It is said that flowers will keep twice as long as usual when this method is employed.



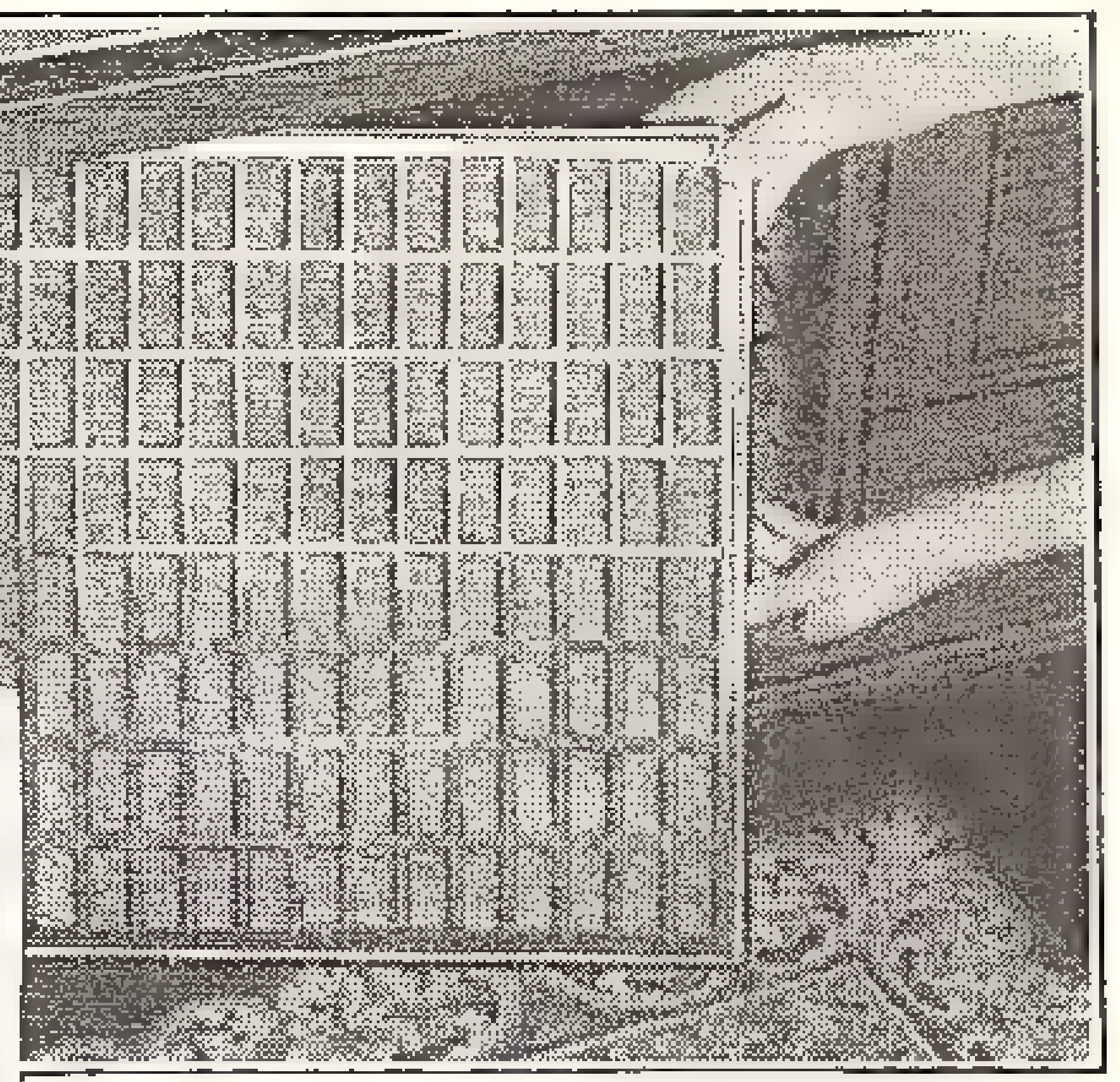
Preventing Short Circuits

When the little strands of wire inside an electric plug work loose they often come in contact with the other side of the circuit and produce short circuits. This may be prevented by filling such plugs with melted sealing wax, sulphur, or just plain household paraffin. Tar or pitch will also serve equally well, and once set in place afford sure insurance against short circuits and possible fires. The melted material used should be fairly hot so it will flow freely into all of the interstices.

Cut Your COAL Bills With FURNACE Ventilating Fan



Here is the ventilating fan in position beside the cold air duct and ready for action. The prop is supported by three iron bars which rest on the edge of the pipe. Make the holes for the belt as small as possible.



These air filter pads, inserted in the outlet pipes in the various rooms, will go a long way towards bettering health and cutting down cleaning costs for draperies and curtains. The fine spun glass removes all the fine particles in the air.

YOU'D be surprised to learn how wasteful the average furnace is. Because the air tends to stagnate in the pipes, there is a lot of heat expended for other purposes than warming the air.

Here's a simple little stunt, however, that will go a long way toward substantially improving the efficiency of your home heating system. The contrivance can easily be rigged up in any home workshop and applied to the furnace in a few minutes.

Fan Keeps Air Circulating

The function it serves is that of keeping the air in circulation in the pipes and hence in the rooms. Every possible calory of heat is utilized, making for a great saving in the coal bills, perhaps a ton or more a season. And a ton is easily worth saving in these times.

The initial outlay will run you slightly more than the price of a ton of coal, but when next winter rolls around again you will be able to put the money-saving device into operation without any cost whatever.

In addition to all this, however, a great benefit will accrue in the form of health betterment. This is made possible by the employment of special filter pads which have recently been put on the market. Made of fine spun glass, as illustrated in the photo at the top of the page, these pads filter out all dust and other dangerous particles which would otherwise be sucked up into human lungs.

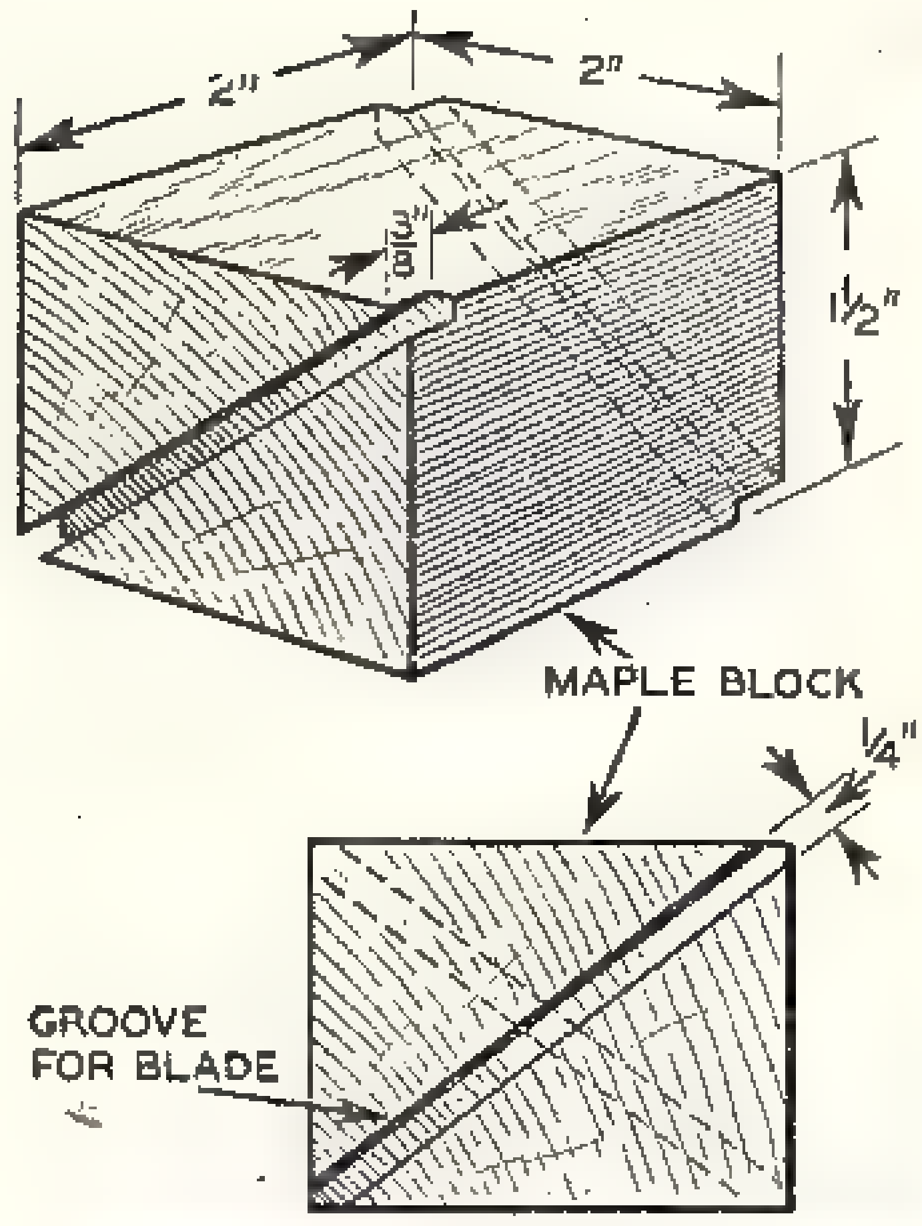
Not only that, but a great saving in the cost of drapes, curtains, etc., is made possible, since most of the dust is extracted from the air by the pads.

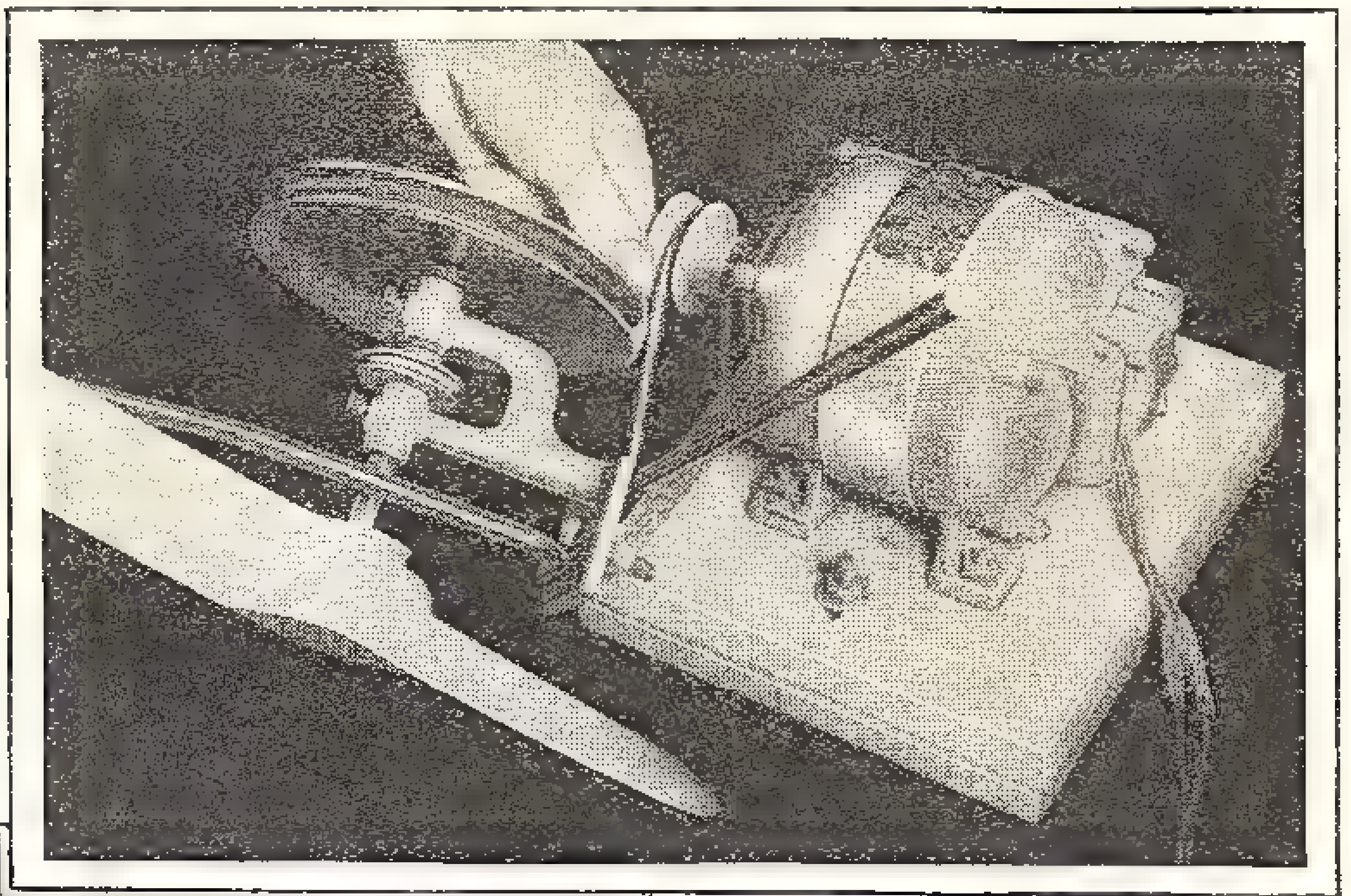
Now let's get down to the actual construction of the contraption. First on the agenda comes the fan, which is really the heart of the ventilating system. The hub should be made from a block of hard wood—any kind you have available. On two sides as illustrated in an accompanying drawing, cut a groove of the dimensions given. This is to take the fan blades.

Use Hard Wood for Blades

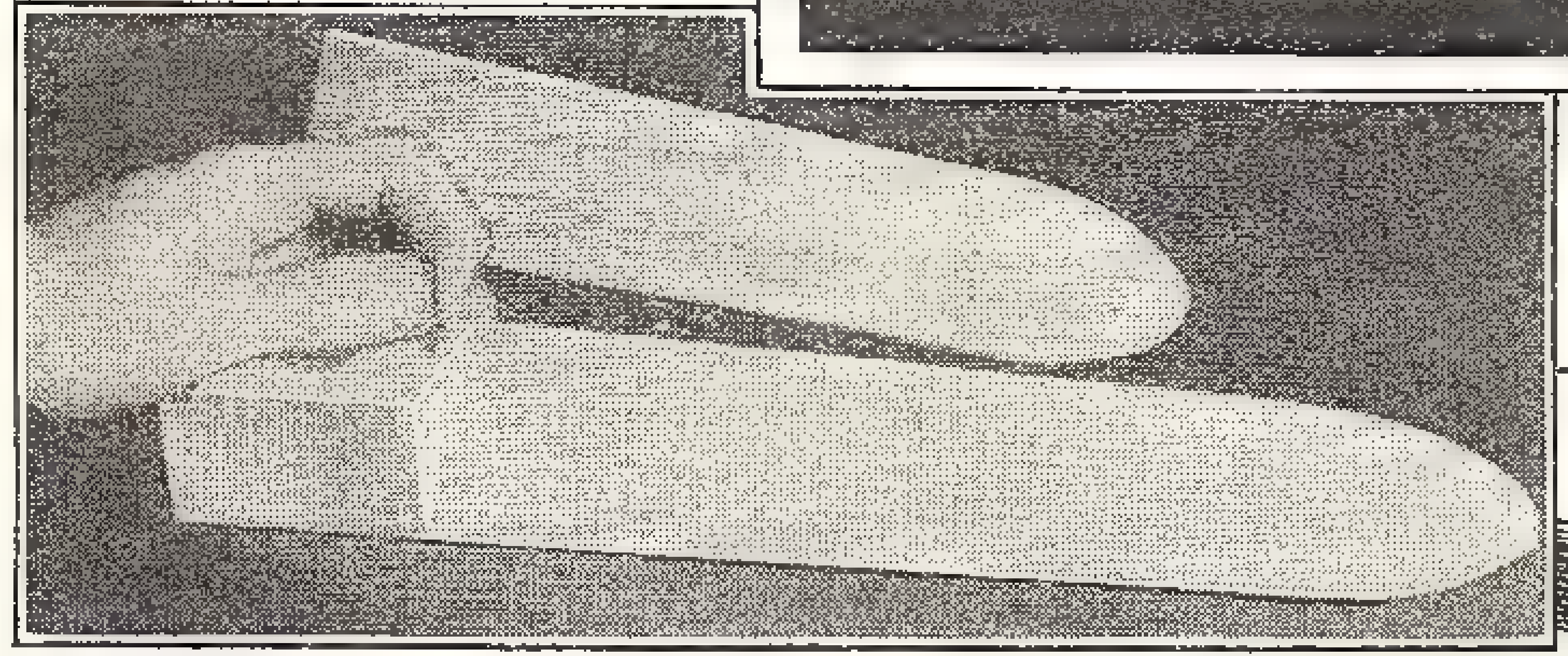
These blades may be made from any hard wood, three ply veneer being quite all right for the job. They should be cut to about the shape given in the accompanying photo. Form the blades so that the widest portion is at the bottom, with a tapering form running towards the tip. The length of the blades should be such that the diameter of the entire prop is about an inch less than the diameter of the pipe into which it is inserted.

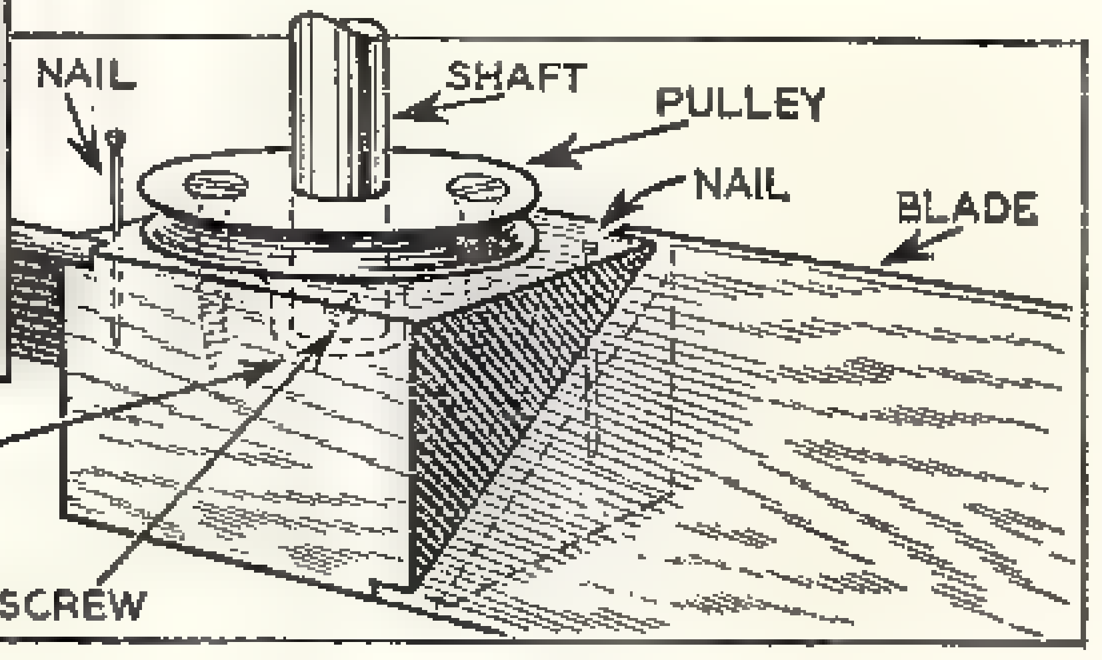
The blades are secured to the hub by first smearing the groove with glue, then inserting the butt of the blade and clinching the bargain with a couple of finishing nails. Of course, the blades are to be set at opposite angles.





All parts of the ventilating system are seen here. The shaft for the fan revolves in a bearing made from lathe headstock.





The fan blades are shaped as illustrated in the photo above. The butt end is glued and nailed into the grooves in the hub block. At right is seen how the pulley to take the shaft is secured to the hub block. A set screw holds the shaft firm, to prevent play and wobbling.

The completed propeller is secured to the shaft upon which it revolves in the manner illustrated in the accompanying drawing. It will first be necessary to bore a hole in the hub to take a short section of the shaft. Then to the hub is screwed a pulley having a collar and set screw. Make all these parts firm, since they have to stand a lot of wear and tear.

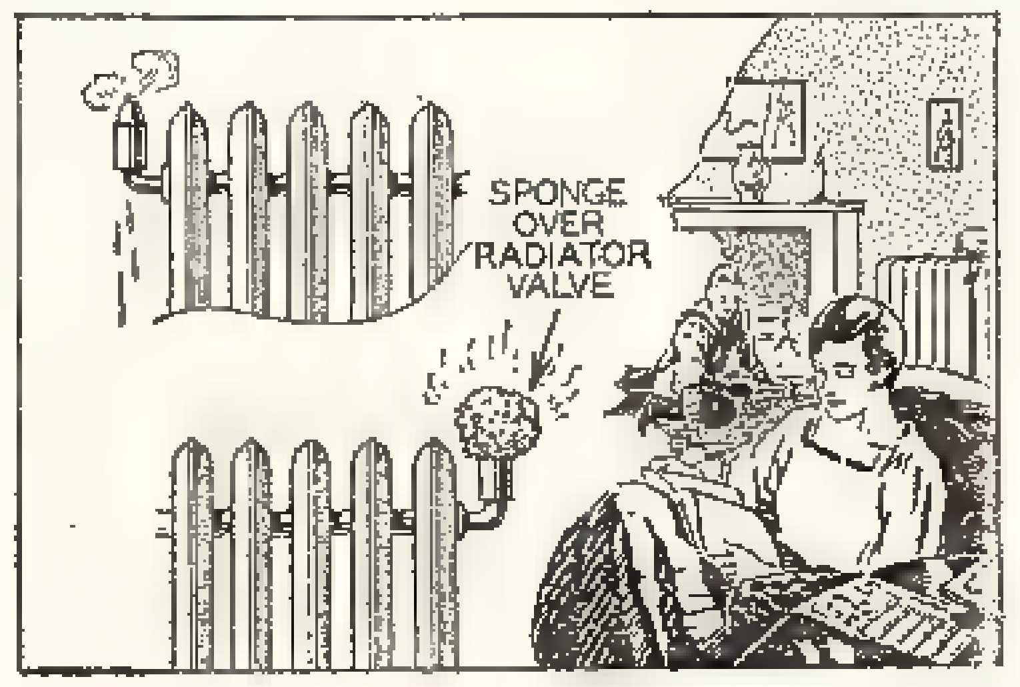
This entire element of the ventilating system rotates in a bearing made from the head stock of an old lathe, which may be procured at any 5-10-25 cent store. Or if you can't procure it there, write to Modern Mechanix and Inventions editors, and they will be glad to give you purchasing data.

Two iron bars, secured to the bottom of the headstock, as illustrated in the drawing at the top of the page, serve as supports for the bearing. The ends of these bars rest in the metal on the periphery of the cold air duct, this latter part being wrapped with asbestos cloth to prevent air leakage.

Now for the power plant. This consists of a quarter, sixth, or eighth horse motor mounted in the position illustrated on the opposite page. It should be provided with as firm a base as possible, but any good electrician knows that. The two pulleys on the motor and the fan blade respectively have a ratio of approximately 1 to 4. You may have to vary this by experimentation.

See that the hole through which the motor pulley passes is as small and as airtight as possible. Current consumption of the motor is small, so that there will be no substantial addition to your electric bill each month.

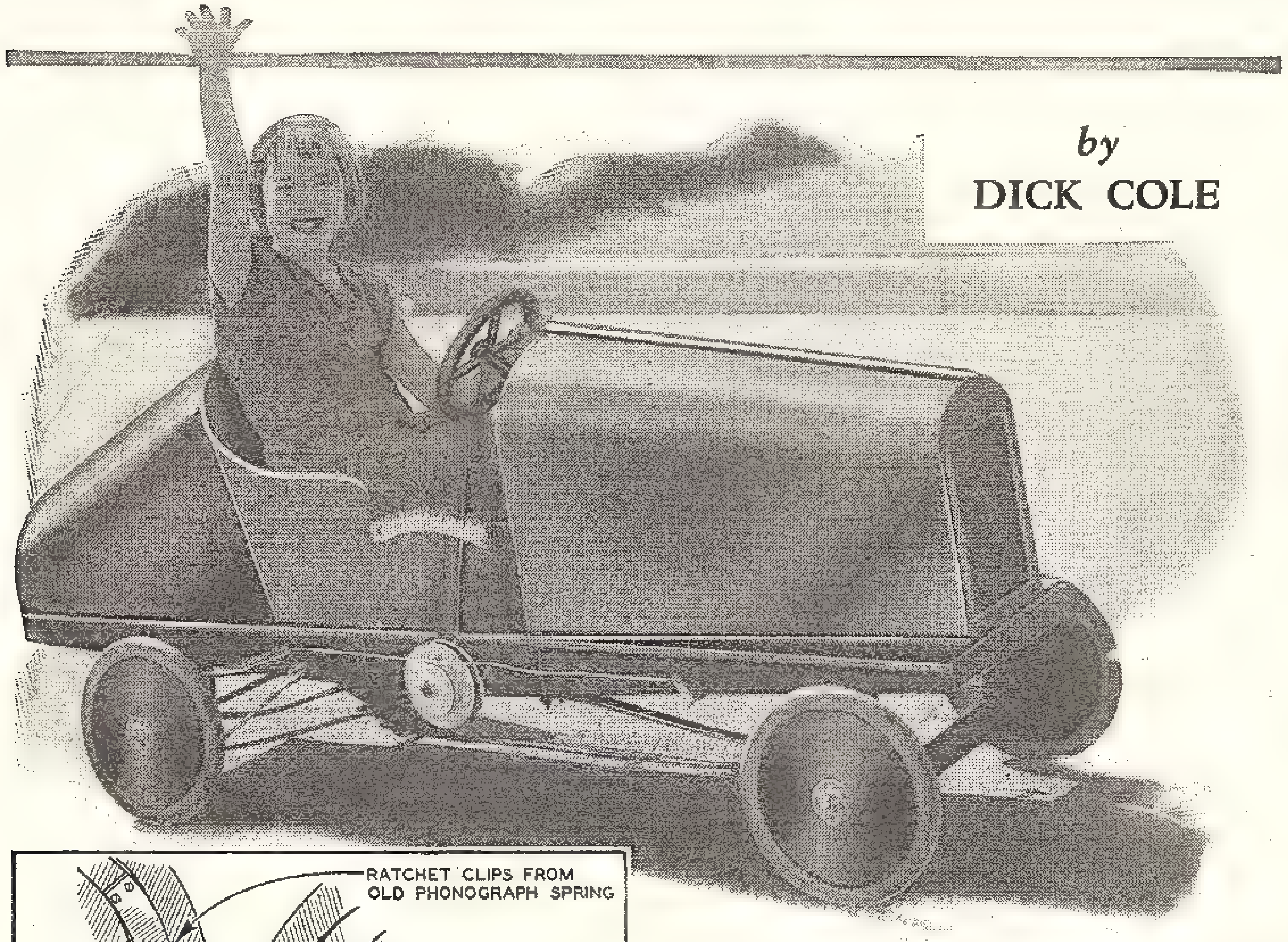
Simple Cure for Leaky Valves



Some radiator valves have an irritating way of dripping, dripping, dripping, with the result that a good carpet is sometimes ruined. Remedy this nuisance by covering the valve with a sponge which has been hollowed out to fit over the metal. The water then soaks into the sponge and evaporates, acting as a humidifier.

Rubber Bands DRIVE This Midget Auto Three Miles

by
DICK COLE



The completed rubber band powered motor ready for a three-mile spin—from a single winding of the rubber band "motor." Headlights, horn, etc., add to attractiveness of car.

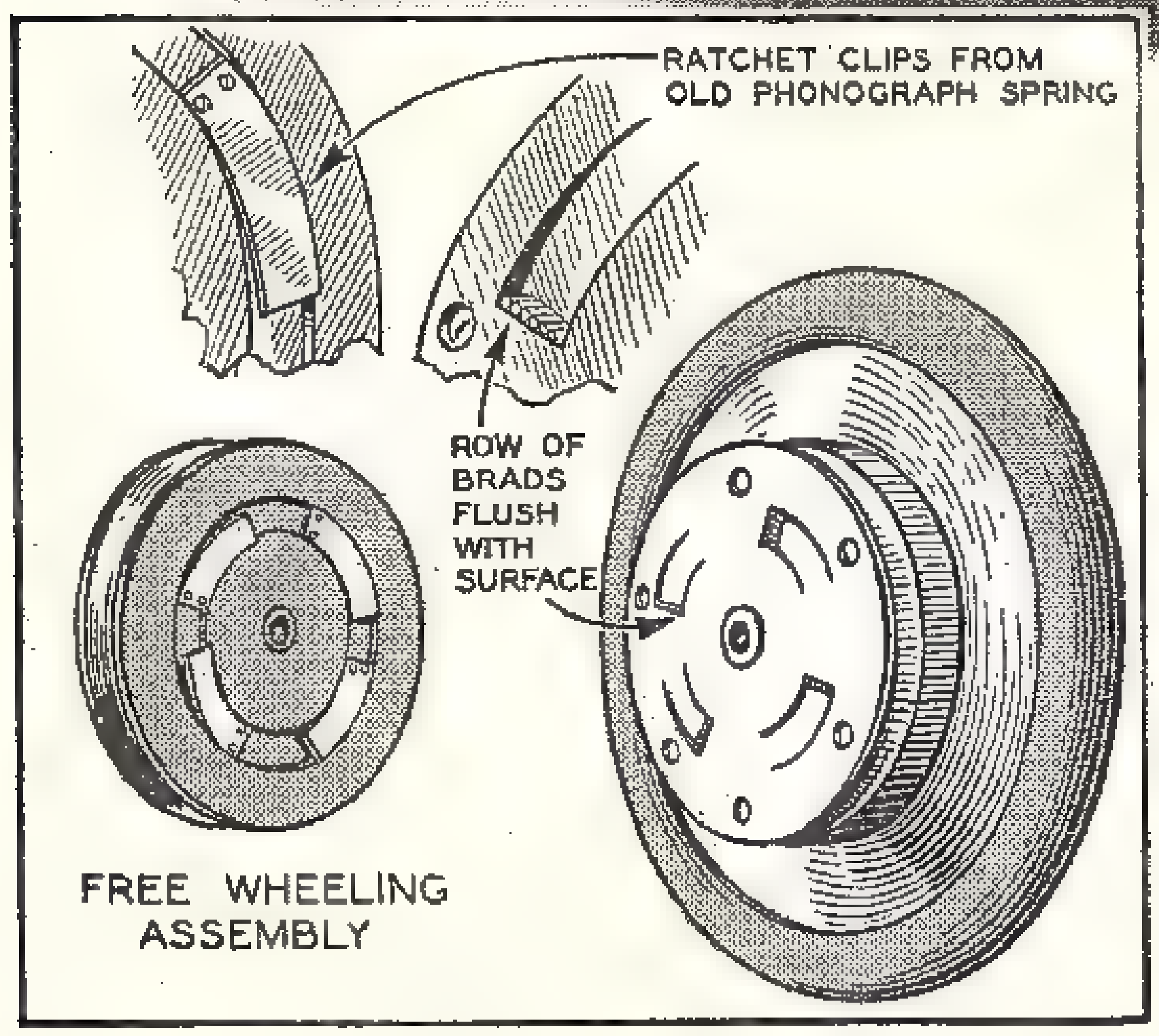

RATCHET CLIPS FROM OLD PHONOGRAPH SPRING
ROW OF BRADS FLUSH WITH SURFACE
FREE WHEELING ASSEMBLY

Fig. 1. Here's how the free wheeling system on the rubber band "motor" works. Note that the ratchet clips engage the notches in the wheel. Most of run is spent free wheeling.

Be there the boy with soul so dead,
Who to himself has never said:
"Gee, I wish I had a baby auto."

THIS article will make those wishes come true. Here is a nifty looking baby with clutch, two forward speeds and reverse, and *Free Wheeling*. The design is simple; the materials are cheap; which brings the building of this miniature car within the scope of the average mechanically minded boy's pocket book.

It is powered with rubber band motors!

Here's something distinctly new in the way of midget autos. Powered by a battery of rubber bands from old inner tubes, it will cover a distance of three miles at a surprising clip—and on one winding. Seated at the wheel you'll be the envy of all the youngsters in town.

Now don't let skepticism enter your mind until you have listened to reason.

To show the reader how much power can be stored up in the rubber band "motor" of the baby car, I shall illustrate. Suppose you looped three, heavy-duty, 6" inner tubes of good, live rubber over a solid post, and looped the other ends around the bumper of a light car. Now start the car. The tubes will stretch out about five times their original length and will actually stall the car *in low gear*.

Now think of the potential energy possessed by those stretched tubes! Think how high they could hurl a rock if made into a giant catapult!

That is the potential power stored in the rubber band motor—only more. When the amount of rubber contained in three inner tubes is cut into narrow strips, the rubber has a greater elastic limit. The purpose of the rubber band motor is to conserve all the available power and deliver it to the wheels of the car in an even flow.

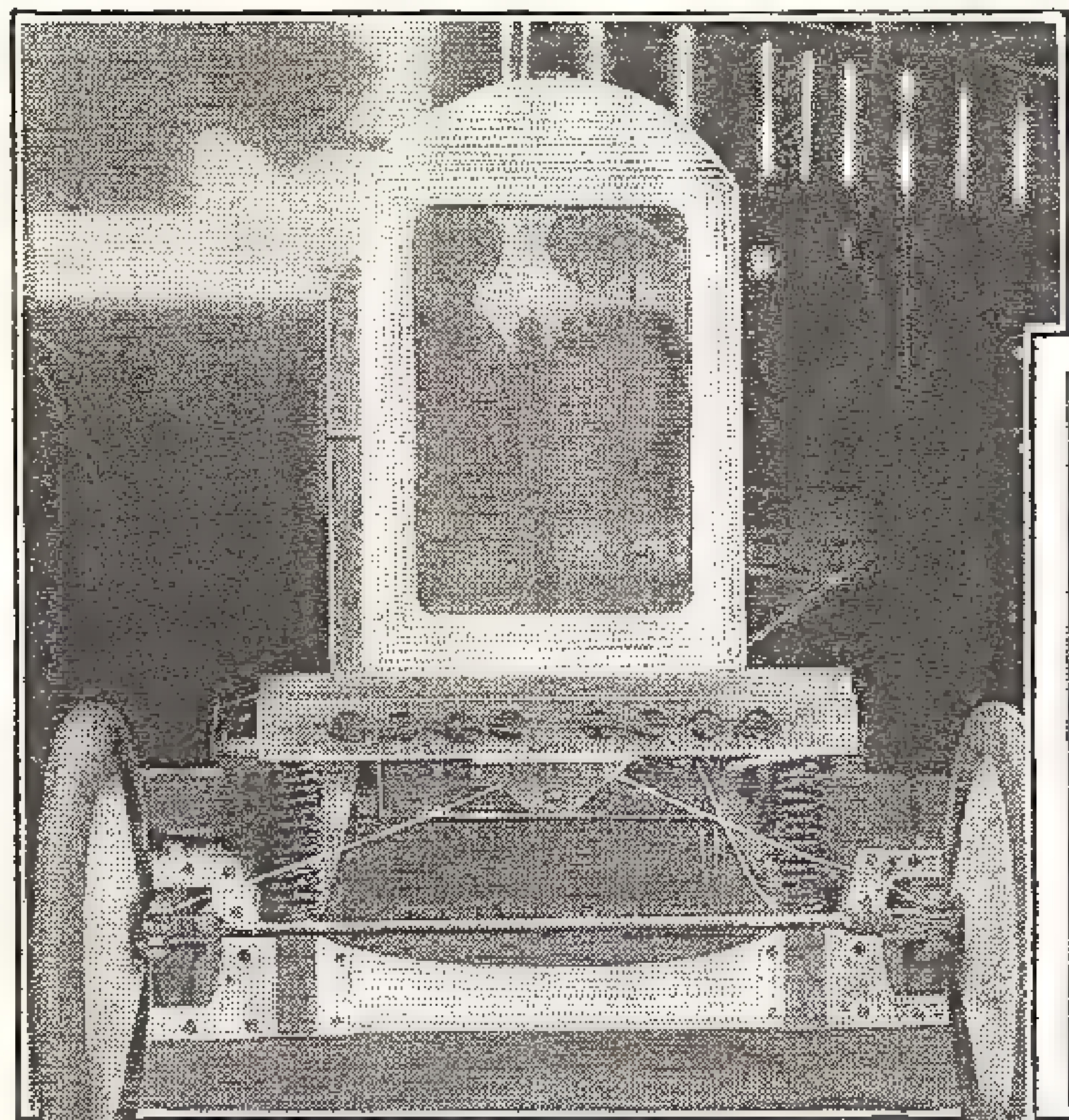
The plan and side view in Figs. 9 and 8 respectively, are not offered to familiarize the builder with the general working principles of the baby car. Here we see the sixteen rubber band motors which contribute their twisting torque through a train of small gears to a common master gear. This, in turn, operates the pinion gear shaft which communicates the power to a cross-shaft, thence by belt drive to the wheels.

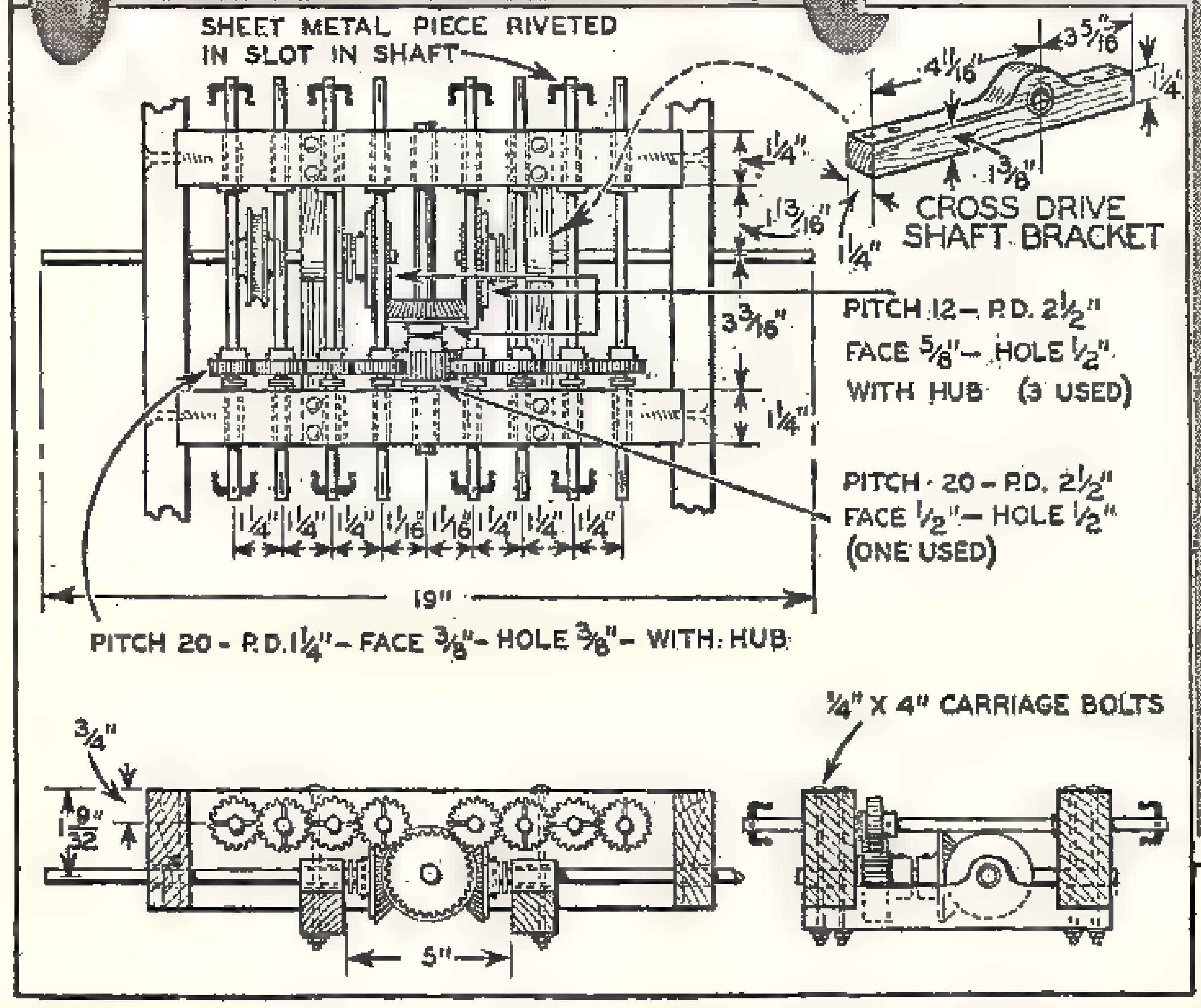
The forward drive is through the right rear wheel only, and two round leather belts running over V pulleys of different sizes provide two speed ratios. Normally the belts are free on the pulleys, but an idler pulley can be brought to bear against either belt. The contact surface of the V pulleys is highly polished so that very little friction is contributed by the slack belt.

The driven pulley floats freely on the back axle, and is fitted with a simple side ratchet device which engages the wheel itself. This provides free wheeling when the rubber band motor is stopped.

This is done by pressing the left pedal. This action snubs a turn of sash-cord in a grooved pulley on the cross drive-shaft. See Fig. 9. Brakes are provided by passing a loop of sash-cord around a grooved pulley bolted to the side of each wheel, and leading the cord to the right pedal.

Each rubber band unit of the motor passes through a hole in the end cross rail




SHEET METAL PIECE RIVETED IN SLOT IN SHAFT
4 11/16"
3 5/16"
1/4
1 1/4"
1 13/16"
1 3/8"
1 1/4"
CROSS DRIVE SHAFT BRACKET
3 3/16"
1 1/4"
PITCH 12 – P.D. 2 1/2" FACE 5/8" – HOLE 1/2" WITH HUB (3 USED)
PITCH - 20 – P.D. 2 1/2" FACE 1/2" – HOLE 1/2" (ONE USED)
1 1/4"
1 1/4"
1 1/4"
1 1/16
1 1/16
1 1/4"
1 1/4"
1 1/4"
19"
PITCH 20 - P.D. 1 1/4" – FACE 3/8" – HOLE 3/8" – WITH HUB
1/4" X 4" CARRIAGE BOLTS
3/4"
1 9/32"
5"

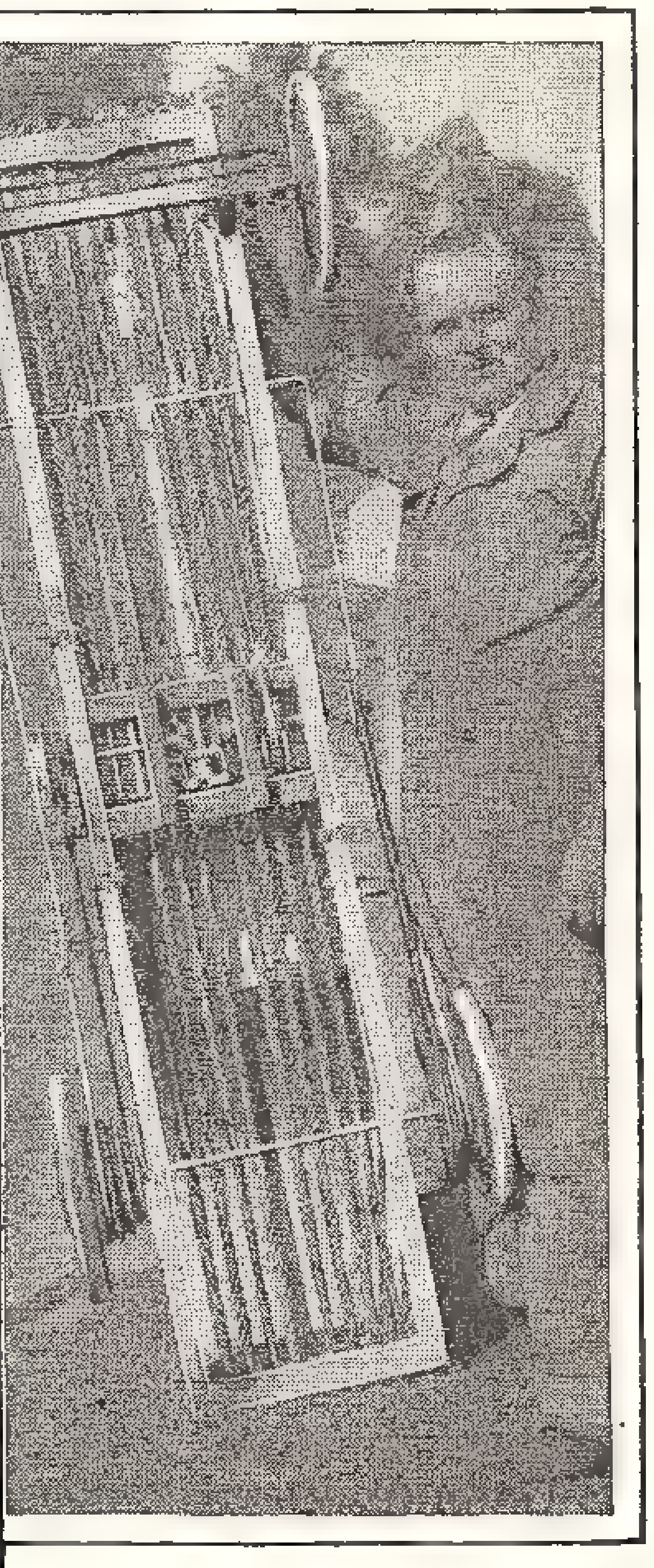


Fig. 2. (Above) Underside view of chassis shows "motor" wound up ready to deliver its power to the gears. Motor assembly, seen in Fig. 3 at left, is built between two cross members at center section of frame. Power is delivered from the rubber bands to the wheels through the Boston stock gears. Front view of the car is seen at top left.

Frame Must Be Strong to Stand Twisting Torque of Rubber Band Motor

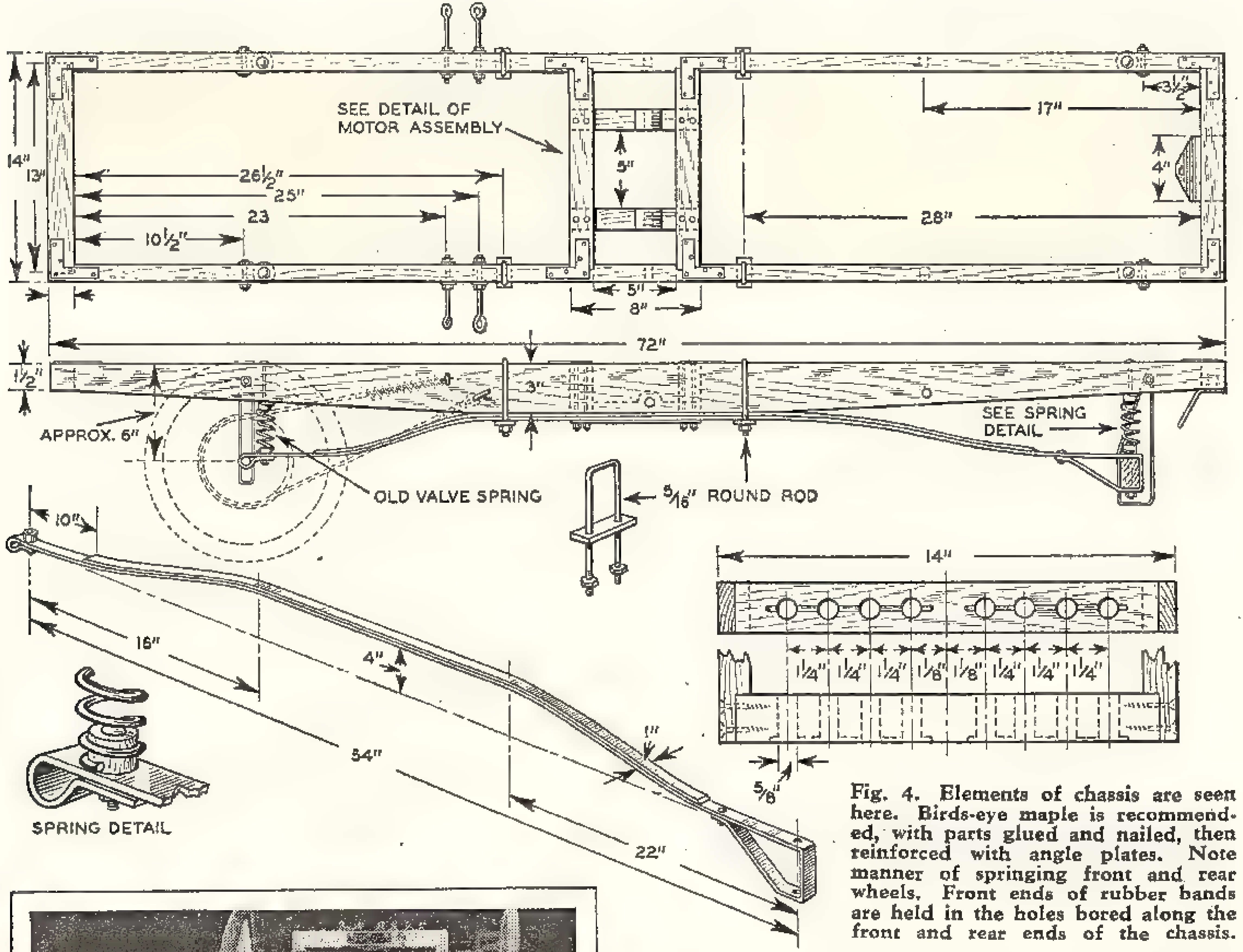

SEE DETAIL OF MOTOR ASSEMBLY
14"
13"
26½"
25"
23
10½"
5"
17"
3½"
4"
28"
5"
8"
72"
1½"
3"
APPROX. 6"
SEE SPRING DETAIL
OLD VALVE SPRING
5/16" ROUND ROD
10"
16"
4"
54"
1"
22"
SPRING DETAIL
14"
1¼" 1¼" 1¼" 1⅛" 1⅛" 1¼" 1¼" 1¼"
5/8"

Fig. 4. Elements of chassis are seen here. Birds-eye maple is recommended, with parts glued and nailed, then reinforced with angle plates. Note manner of springing front and rear wheels. Front ends of rubber bands are held in the holes bored along the front and rear ends of the chassis.

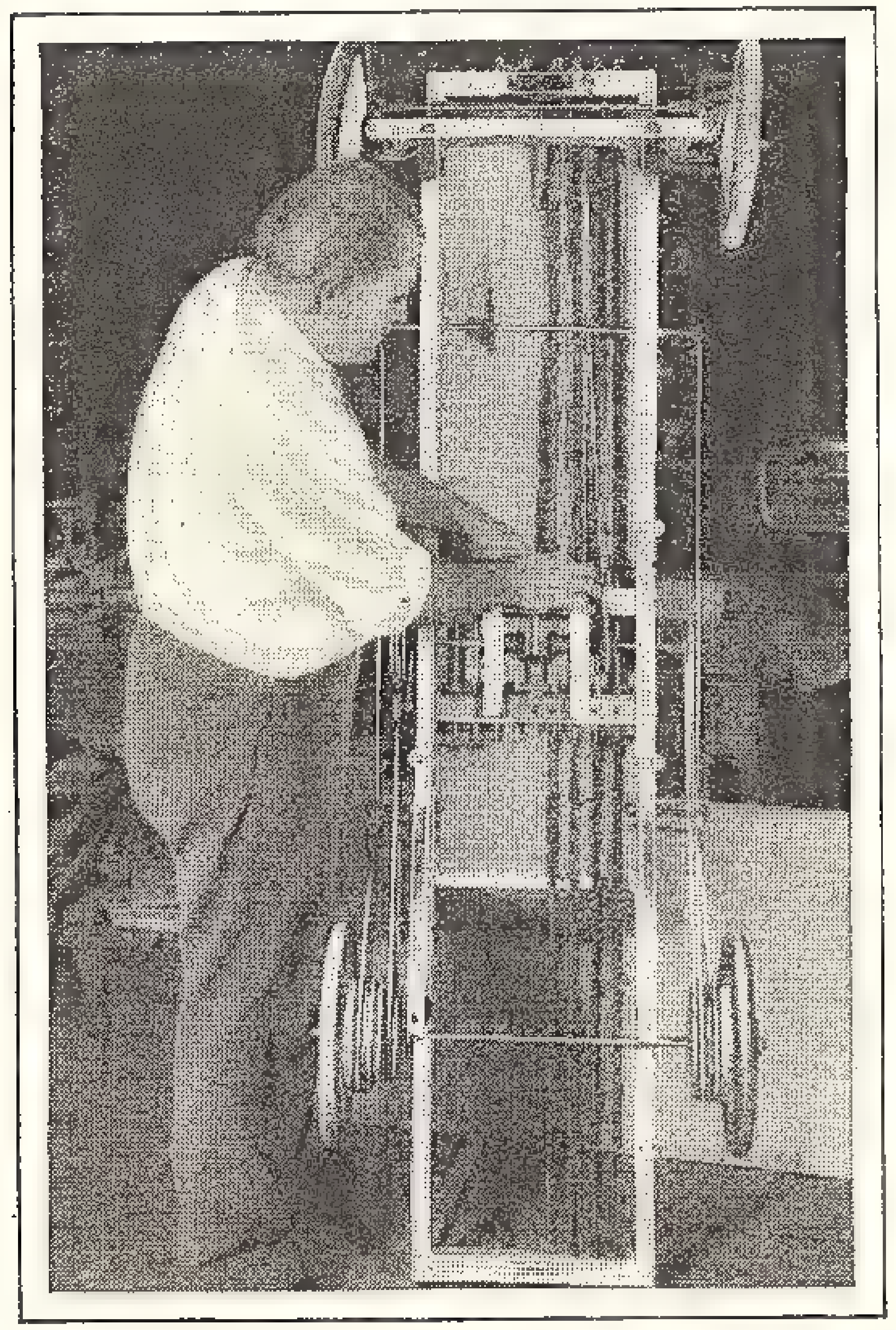


Fig. 5. You can get a clear idea as to how the rubber bands are secured to the frame from this photo. Observe also pulleys on rear wheels for braking and transmission.

of the frame and is fastened to a special clip (Fig. 10). This permits the bands to be stretched while winding, which adds greatly to the capacity of the motor.

Fig. 4 shows the frame of the baby auto. Let it be understood that this must be strong and rigid to resist the twisting torque and pull of the sixteen rubber band motor. It is well to tightly mortise, glue and screw all joints, and, as an extra precaution, cap the joints with angle plates. The middle rails support the transmission unit of the motor, but this is covered in a special detail (Fig. 3).

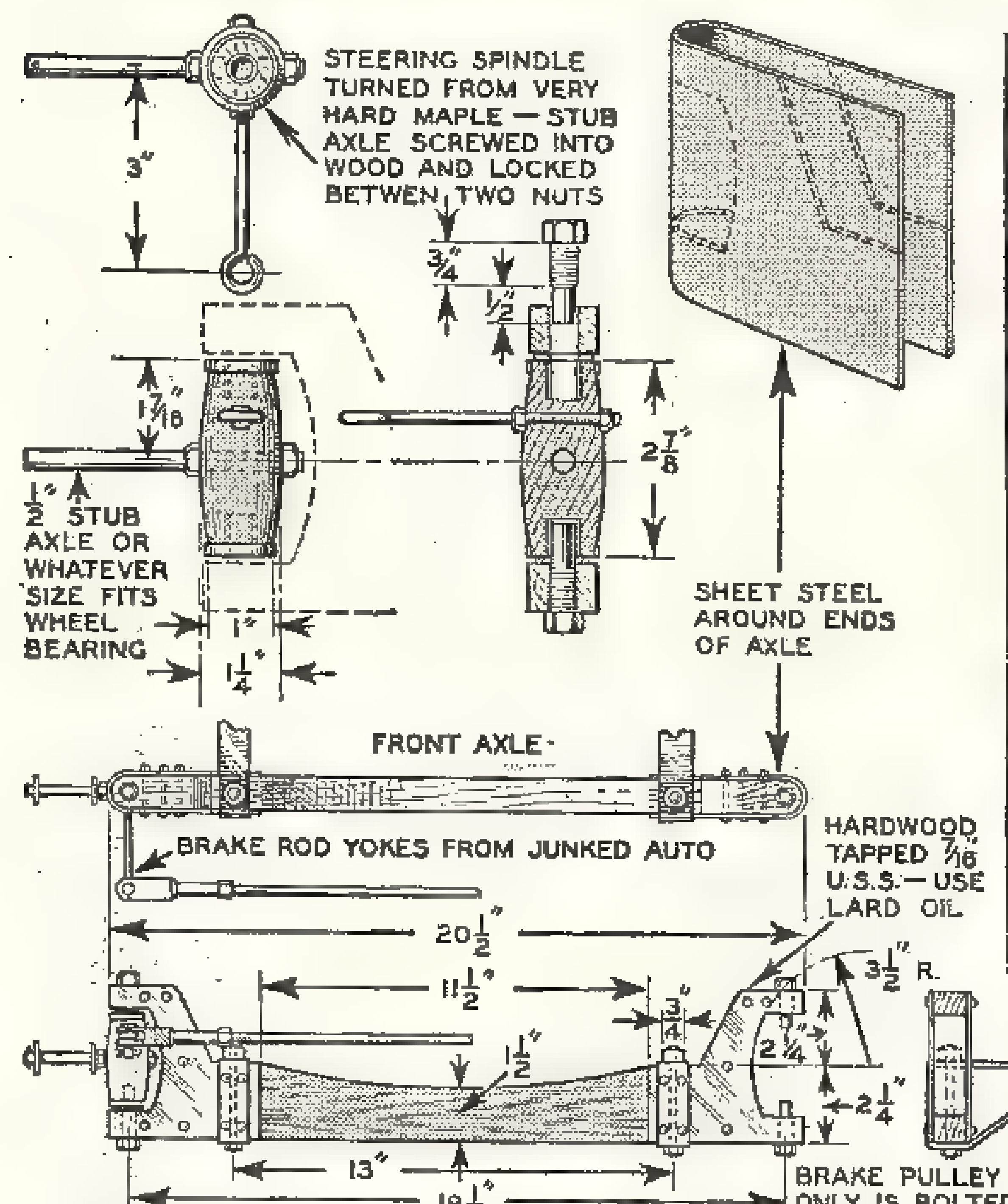
Front Axle

Fig. 6 covers all the details of the front axle and the steering spindles. Carefully selected wood should be used, and an especially hard, knotty piece for the steering spindles. Birds-eye maple is recommended.

The sheet metal plates around the ends of the axle should be secured in place before cutting the notch to receive the steering spindle (See Fig. 6). The cutting can be done on a jig-saw with a metal cutting blade. The size of the wheel axles depends upon the size of the hole in the wheels used.

An old brake-rod with yokes, from an auto wrecking yard, will provide the tie-rods in conjunction with arms made of 5/16" eyebolts. The steering wheel hook-up is shown in a later detail. The spring suspension method of the front axle is better understood by consulting Fig. 4.

Power Is Delivered to Rear Wheels Through Belts Over Idler Pulleys


STEERING SPINDLE TURNED FROM VERY HARD MAPLE—STUB AXLE SCREWED INTO WOOD AND LOCKED BETWEEN TWO NUTS
3"
3/4"
1/2"
1 7/16"
2 7/8"
1/2" STUB AXLE OR WHATEVER SIZE FITS WHEEL BEARING
1"
1¼"
SHEET STEEL AROUND ENDS OF AXLE
FRONT AXLE
BRAKE ROD YOKES FROM JUNKED AUTO
HARDWOOD TAPPED 7/16 U.S.S.—USE LARD OIL
20½"
11½"
3½" R.
1½"
3/4"
2¼
2¼
13"
19½"

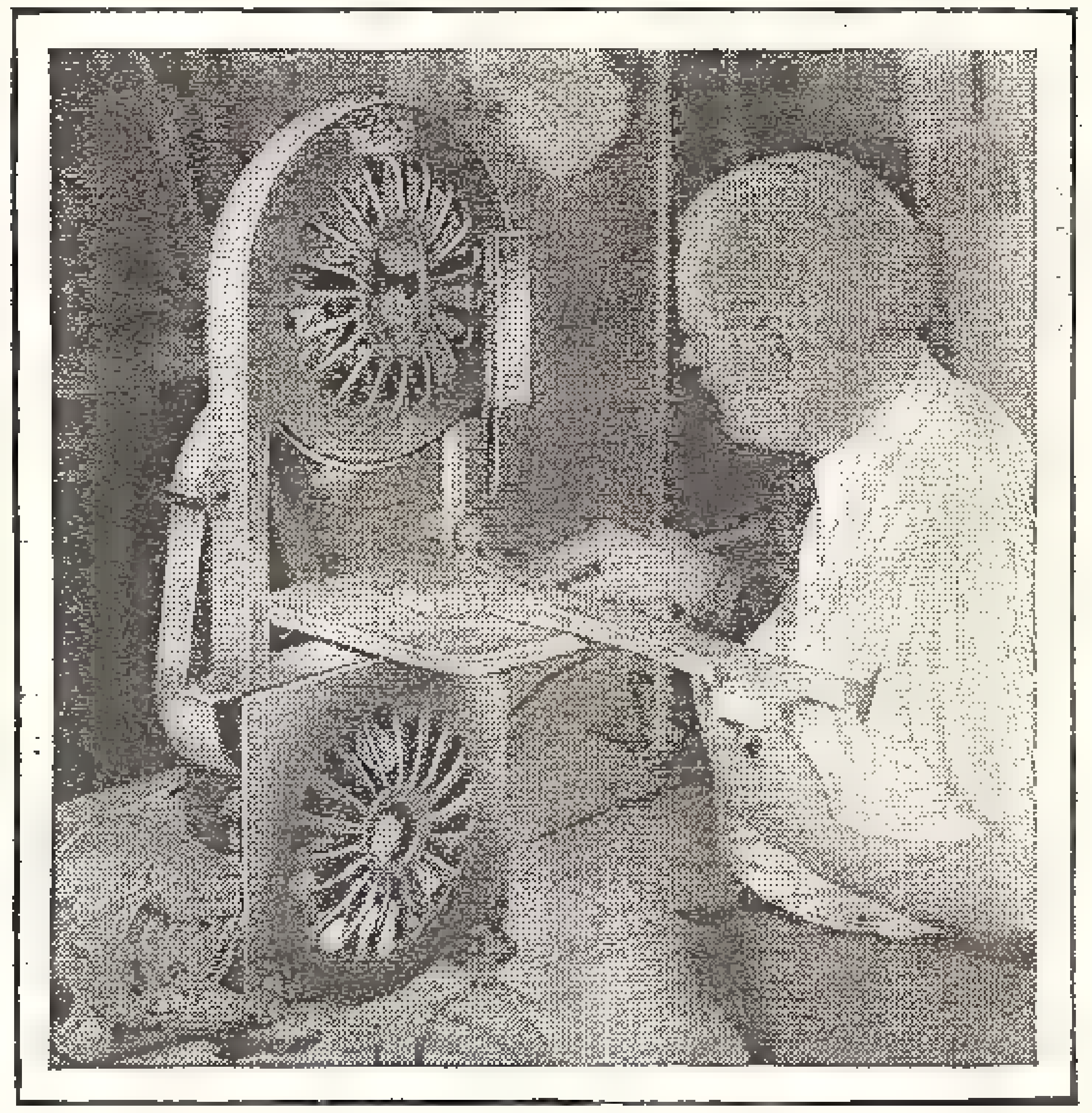


Fig. 7. You will find it easy to cut out the front axle on the auto with a band-saw. The ends are strengthened with sheet steel which also serves to hold the steering spindle as illustrated in the drawings at left.

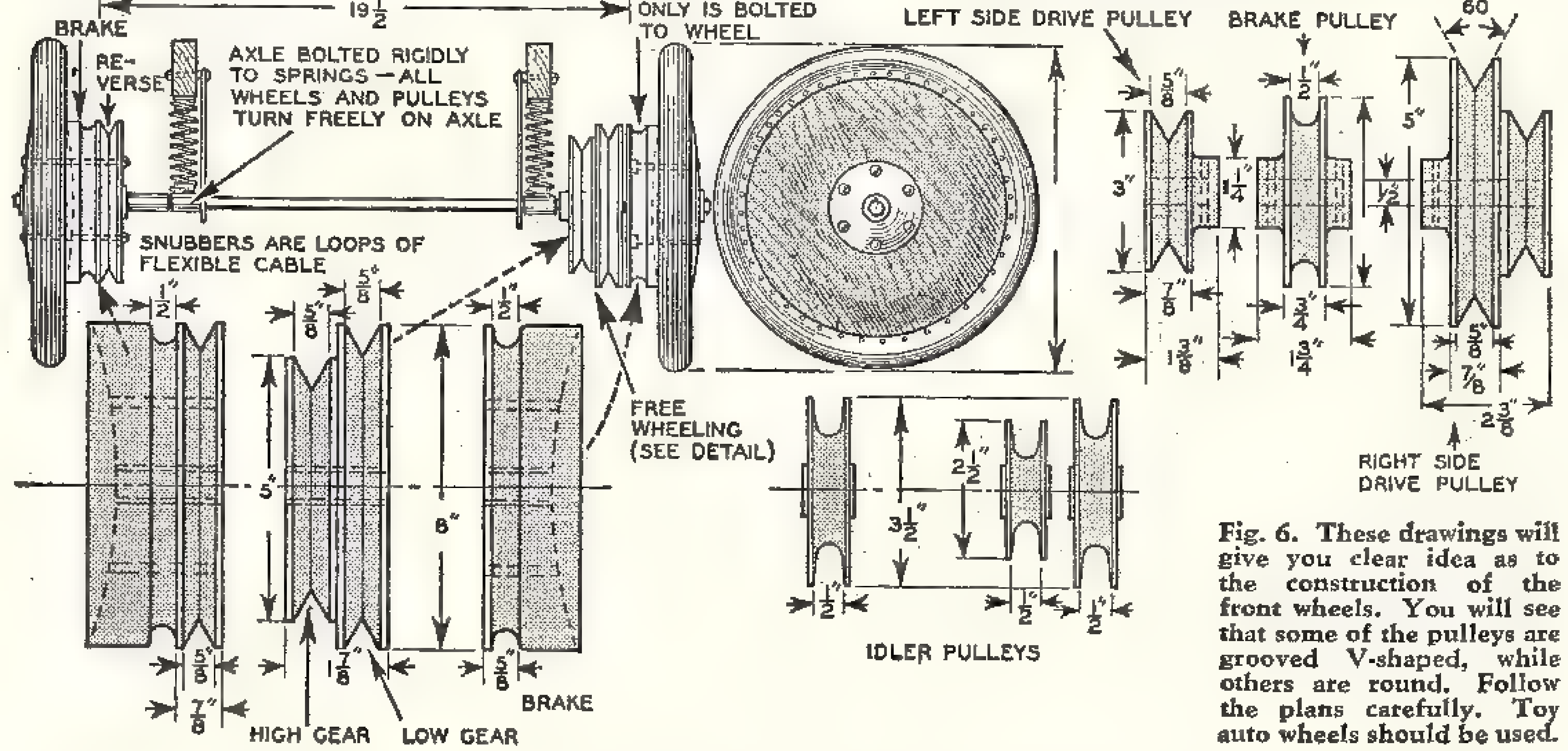

BRAKE PULLEY ONLY IS BOLTED TO WHEEL
BRAKE
REVERSE
AXLE BOLTED RIGIDLY TO SPRINGS—ALL WHEELS AND PULLEYS TURN FREELY ON AXLE
SNUBBERS ARE LOOPS OF FLEXIBLE CABLE
FREE WHEELING (SEE DETAIL)
LEFT SIDE DRIVE PULLEY
BRAKE PULLEY
60°
5/8"
1/2"
3"
1¼
5"
1/2
7/8"
3/4"
1⅜"
1¾"
5/8"
7/8"
2⅜"
RIGHT SIDE DRIVE PULLEY
1/2"
5/8"
5/8"
1/2"
5"
8"
5/8"
7/8"
1⅞"
5/8"
HIGH GEAR
LOW GEAR
BRAKE
2½"
3½"
1/2"
1/2"
1/2"
IDLER PULLEYS

Fig. 6. These drawings will give you clear idea as to the construction of the front wheels. You will see that some of the pulleys are grooved V-shaped, while others are round. Follow the plans carefully. Toy auto wheels should be used.

In Fig. 6 we have the rear axle, drive pulleys, free-wheeling and the spring suspension of the midget car. The notations attached to the drawings should make everything obvious. Here we see how four discarded valve springs add support to the otherwise rather flimsy springs.

The simplicity of the free-wheeling is shown in Fig. 1 and needs no explanation. It is the free wheeling feature which gives the baby auto its wide range of travel. A few impulse turns of the motor, then free-wheel, and so on. By this economical means the car has a travel range of over three miles on one winding of the motor.

The sketch shows 12" rubber-tired coaster wagon or scooter wheels used. These can be obtained from a hardware jobber dealing in toys, etc. They may have to be ordered special and cost about $3.50 a set of four.

In Fig. 3 we have the vital unit of the baby car—the power and transmission assembly. While this may seem rather complicated at first look, it is really very simple. Stock gears are used throughout, and can be bought cheaply from manufacturer's distributors throughout the country. If you have difficulty obtaining the gears, Modern Mechanix will inform you of your nearest agent.

Of course all the holes must be laid out carefully, and, for safety, it is best to allow about .005" more than the regular pitch

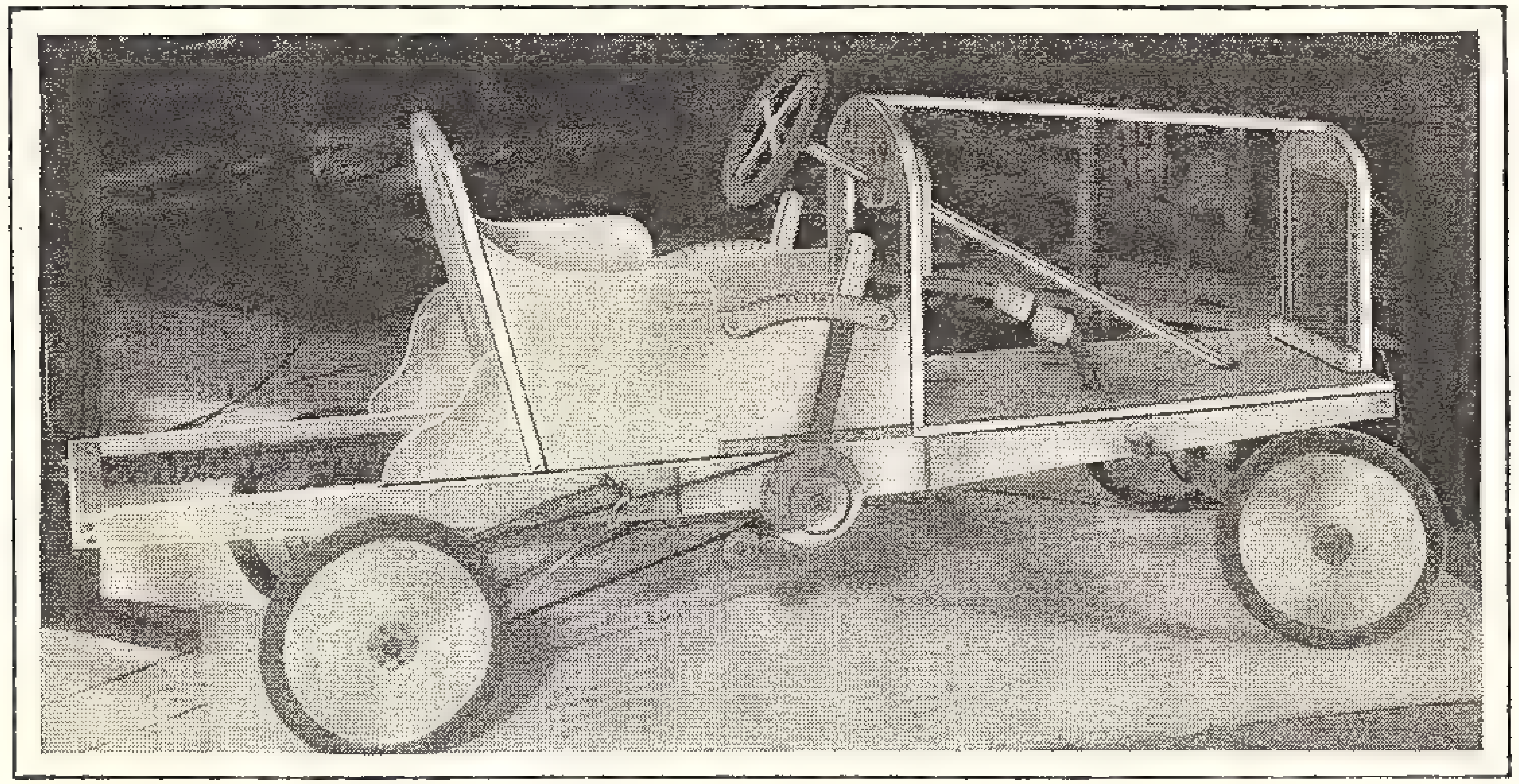


Fig. 8. Ready for covering. Note positions of clutch and brake pedals in front and control lever at side.

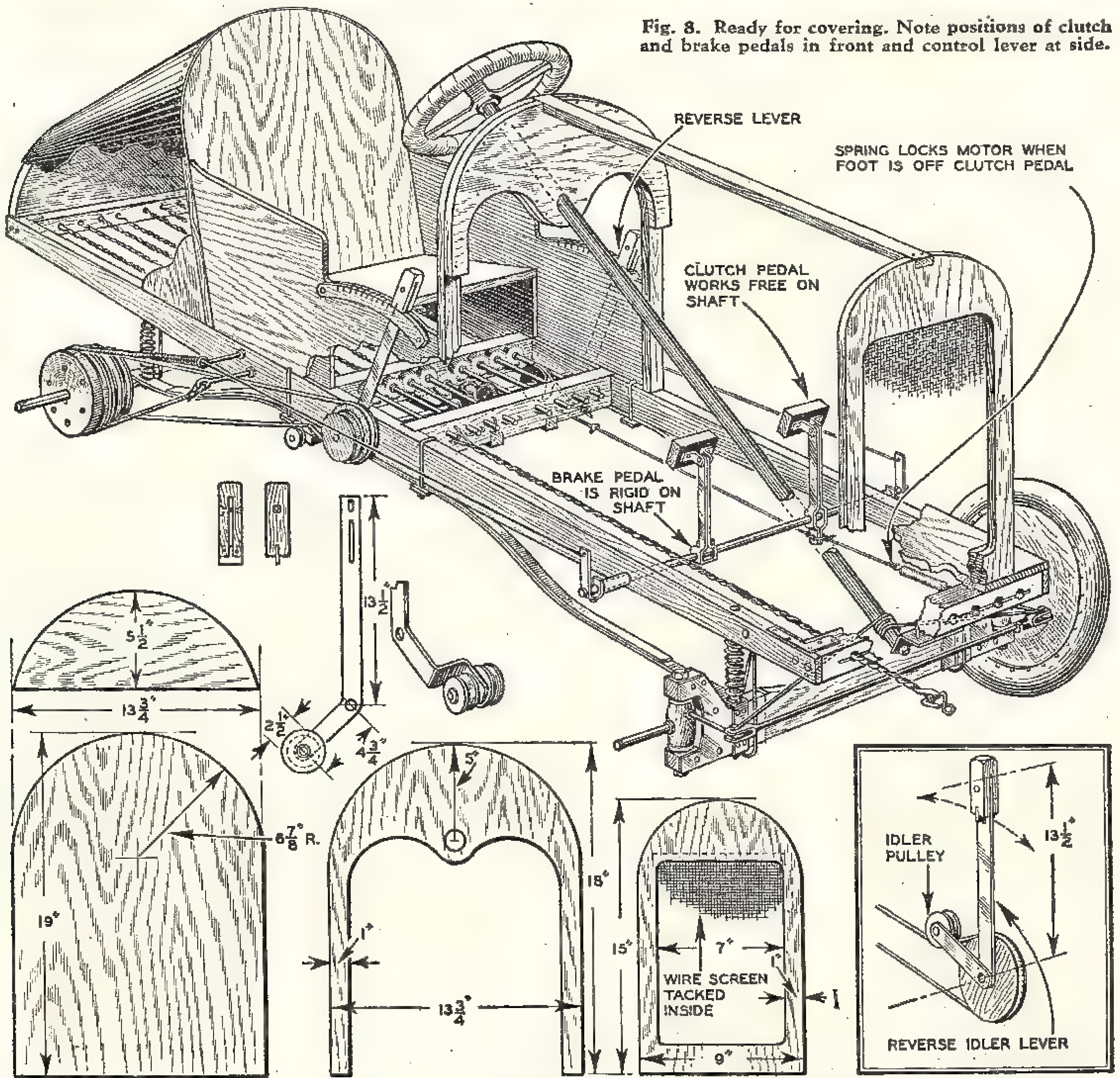

REVERSE LEVER
SPRING LOCKS MOTOR WHEN FOOT IS OFF CLUTCH PEDAL
CLUTCH PEDAL WORKS FREE ON SHAFT
BRAKE PEDAL IS RIGID ON SHAFT
$13\frac{1}{2}$"
$5\frac{1}{2}$"
$13\frac{3}{4}$"
$2\frac{1}{2}$"
$4\frac{3}{4}$"
$6\frac{7}{8}$" R.
19"
5"
18"
1"
$13\frac{3}{4}$"
15"
7"
1"
WIRE SCREEN TACKED INSIDE
9"
IDLER PULLEY
$13\frac{1}{2}$"
REVERSE IDLER LEVER

Fig. 9. Assemble the parts for the car as illustrated in this drawing. Give particular attention to idler lever and pulley.

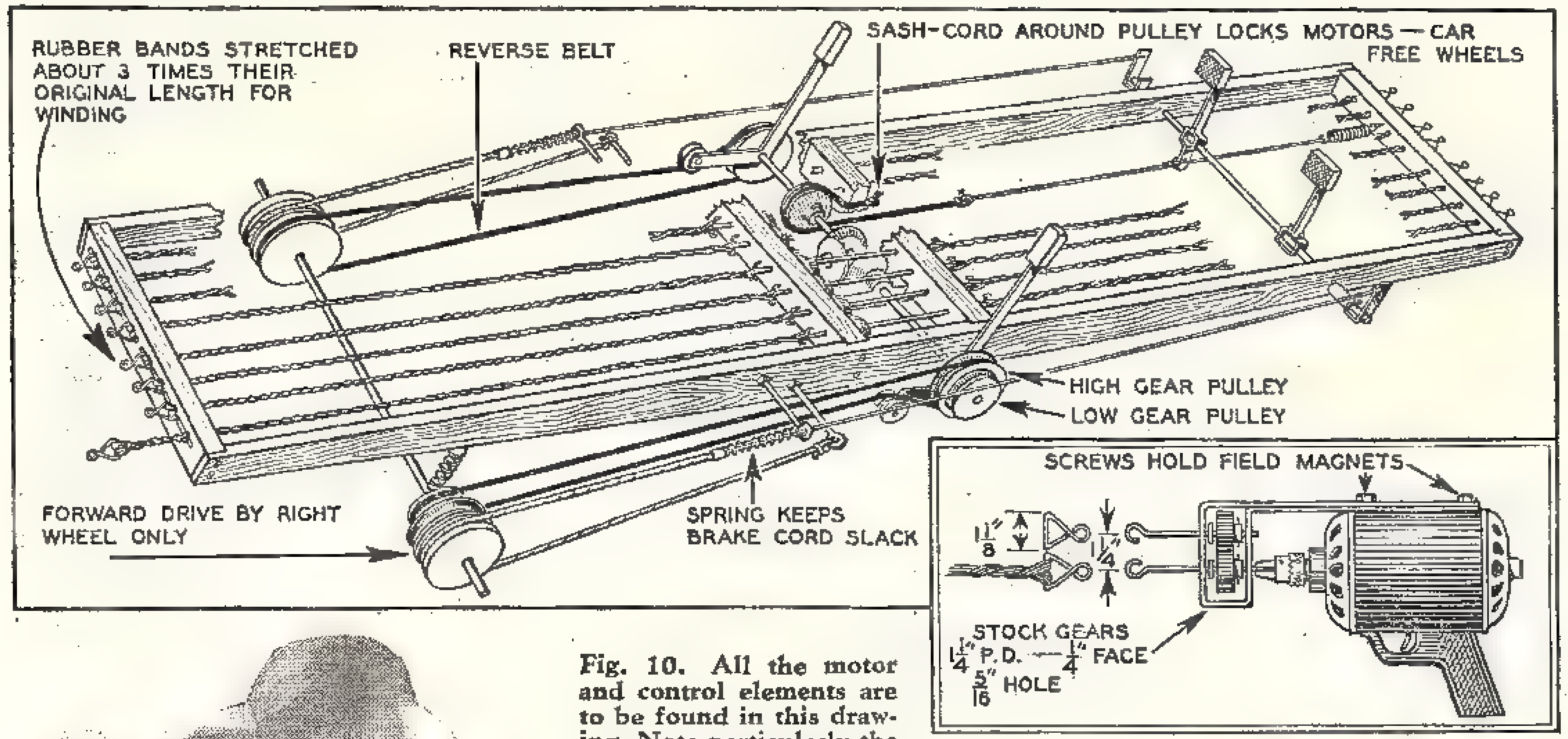
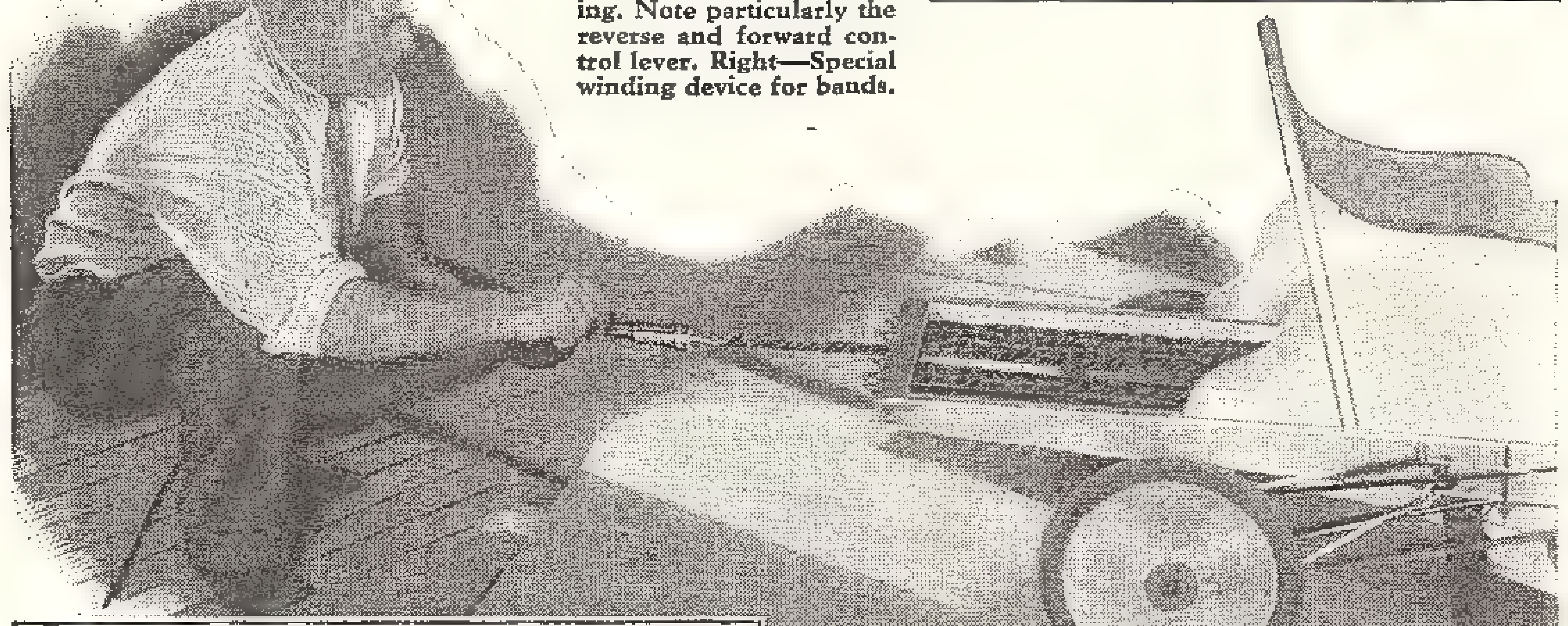
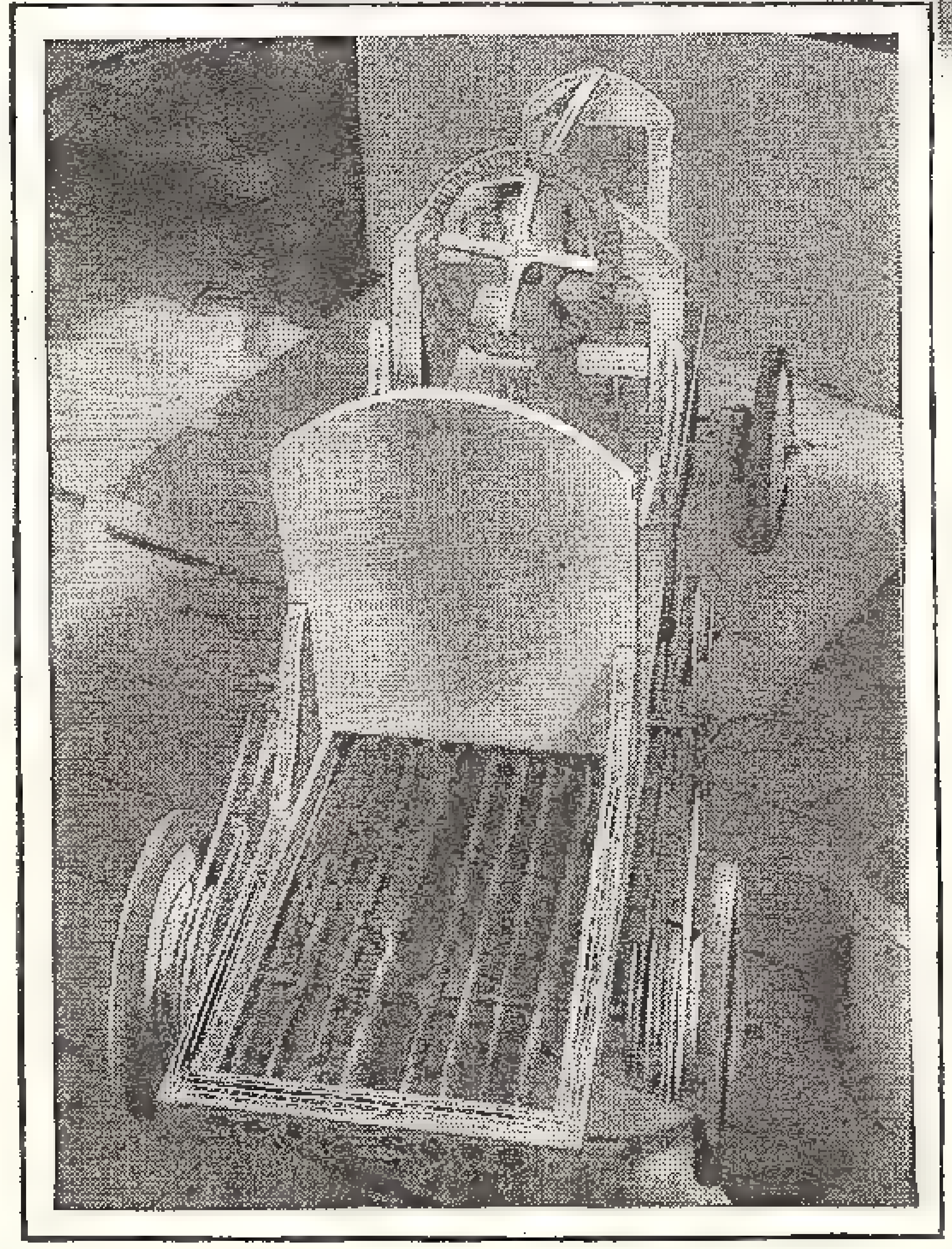

RUBBER BANDS STRETCHED ABOUT 3 TIMES THEIR ORIGINAL LENGTH FOR WINDING
REVERSE BELT
SASH-CORD AROUND PULLEY LOCKS MOTORS — CAR FREE WHEELS
HIGH GEAR PULLEY
LOW GEAR PULLEY
FORWARD DRIVE BY RIGHT WHEEL ONLY
SPRING KEEPS BRAKE CORD SLACK
SCREWS HOLD FIELD MAGNETS
$1\frac{1}{8}$"
$1\frac{1}{4}$"
STOCK GEARS
$1\frac{1}{4}$" P.D. — $\frac{1}{4}$" FACE
$\frac{5}{16}$" HOLE

Fig. 10. All the motor and control elements are to be found in this drawing. Note particularly the reverse and forward control lever. Right—Special winding device for bands.





Above—Fig. 11. Wind up "motor" as illustrated here. Special crank disengages the rubber band, twists it, then slips it back into slot. Be sure to wind all bands in same direction.

Left—Fig. 12. Back view gives good idea as to how pulleys are arranged on rear wheels for braking and power transmission. Rubber bands are all wound up for 3-mile spin.

diameter to prevent the possibility of any binding. All the gears are "with hubs," and it is better to pin them to the shafts than to trust to set screws only.

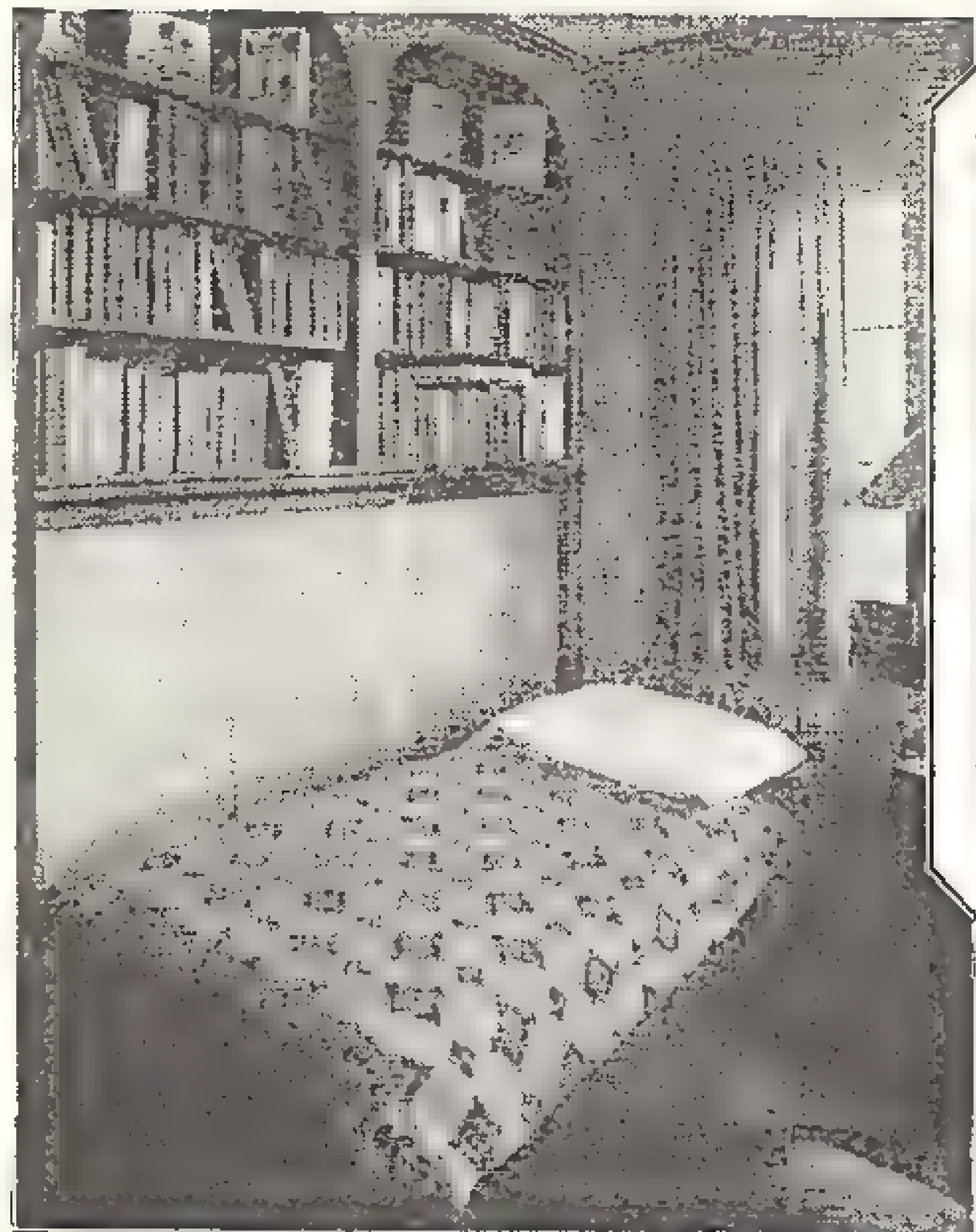
The location of the motor brake pulley—or clutch pulley—is shown. It can readily be understood how a length of sash-cord can be led to the clutch pedal, and how it will snub the pulley when the pedal is depressed.

Fig. 9 gives the layout of all the pulleys. Selected white maple will serve for all the pulleys, but it is suggested that fiber or aluminum be used for the idler pulleys. These, of necessity, must be very thin to clear the idle belt.

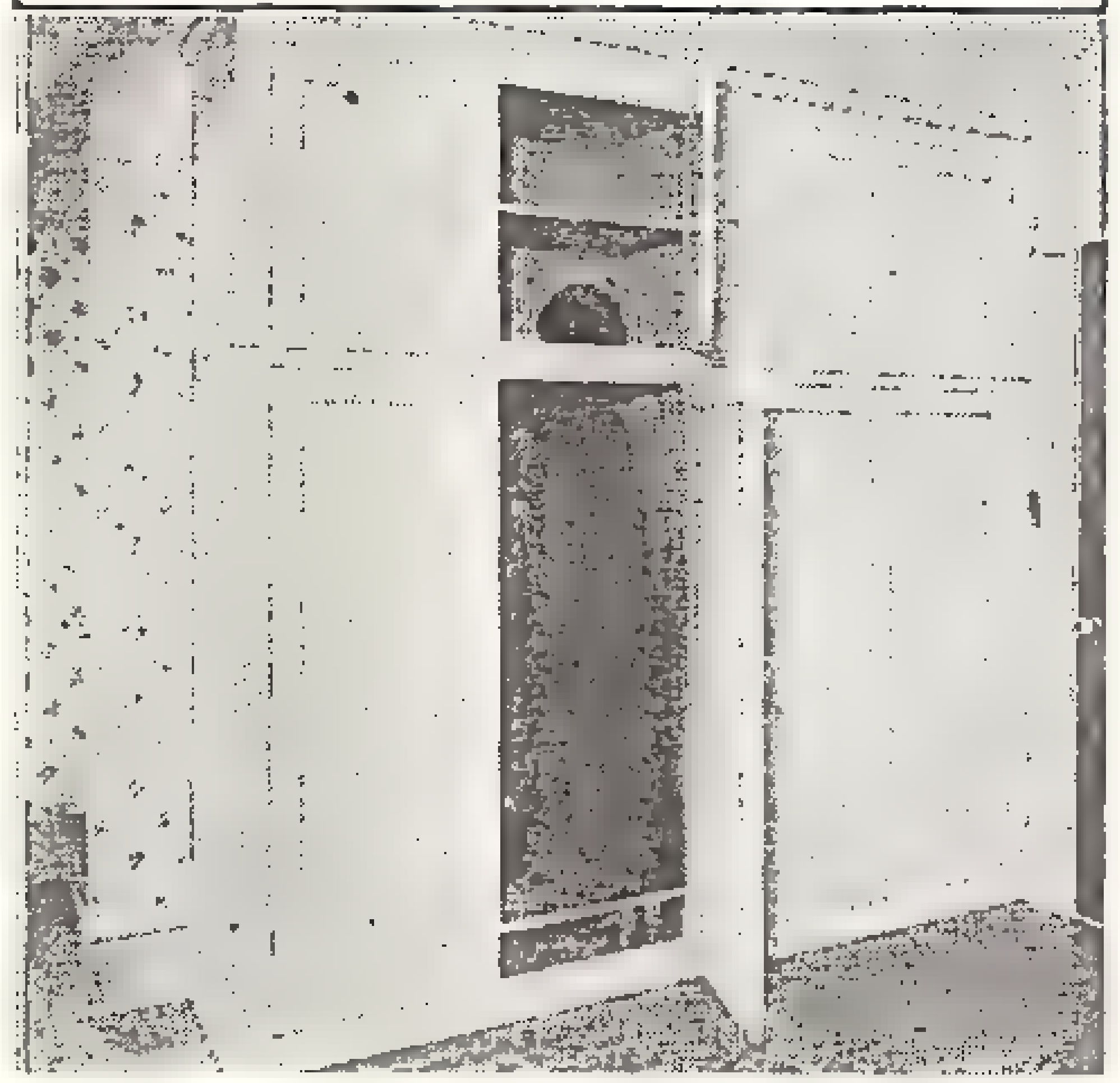
Note that all the drive pulleys are grooved 60 degrees. Round belts are used for transmission, and after a little wear they will assume narrow, flat sides which

(Continued on page 136)

Up-To-Date Homes Have These BUILT-IN Features



Bed is equipped with springs that fasten to inner panel. When bed is open, it rests on two leather-covered stools built especially to support it.



Even in a house where the doors are finished walnut or oak, these cedar-lined wardrobes are usually enameled to match the baseboards and door frame of the room.

Behind these attractively stenciled doors of walnut are hidden magazines and books, containing valuable information, that are no longer presentable to the house guests.

ALTHOUGH there has been a gradual but drastic change in home-building in the last few years, at least one demand has remained constant, and that is the home maker's insistence upon ample accommodations for books, kitchen utensils, provisions and clothing.

Although today's home is smaller than the Victorian home, more space is given to book shelves, cupboards, and closets than heretofore, and the space is utilized to better advantage. The accompanying photographs show practical ways of handling these features.

The arrangement of the kitchen cupboards shown is perfect. The commodious bins and shelves furnish plenty of room for groceries, cooking utensils, flavorings, cleaning powders, soaps, kitchen linens and china.

Suites of kitchen units may be bought either of the detachable type or ready to build in. One may begin with a single cabinet and add pieces until the entire available wall space is covered.

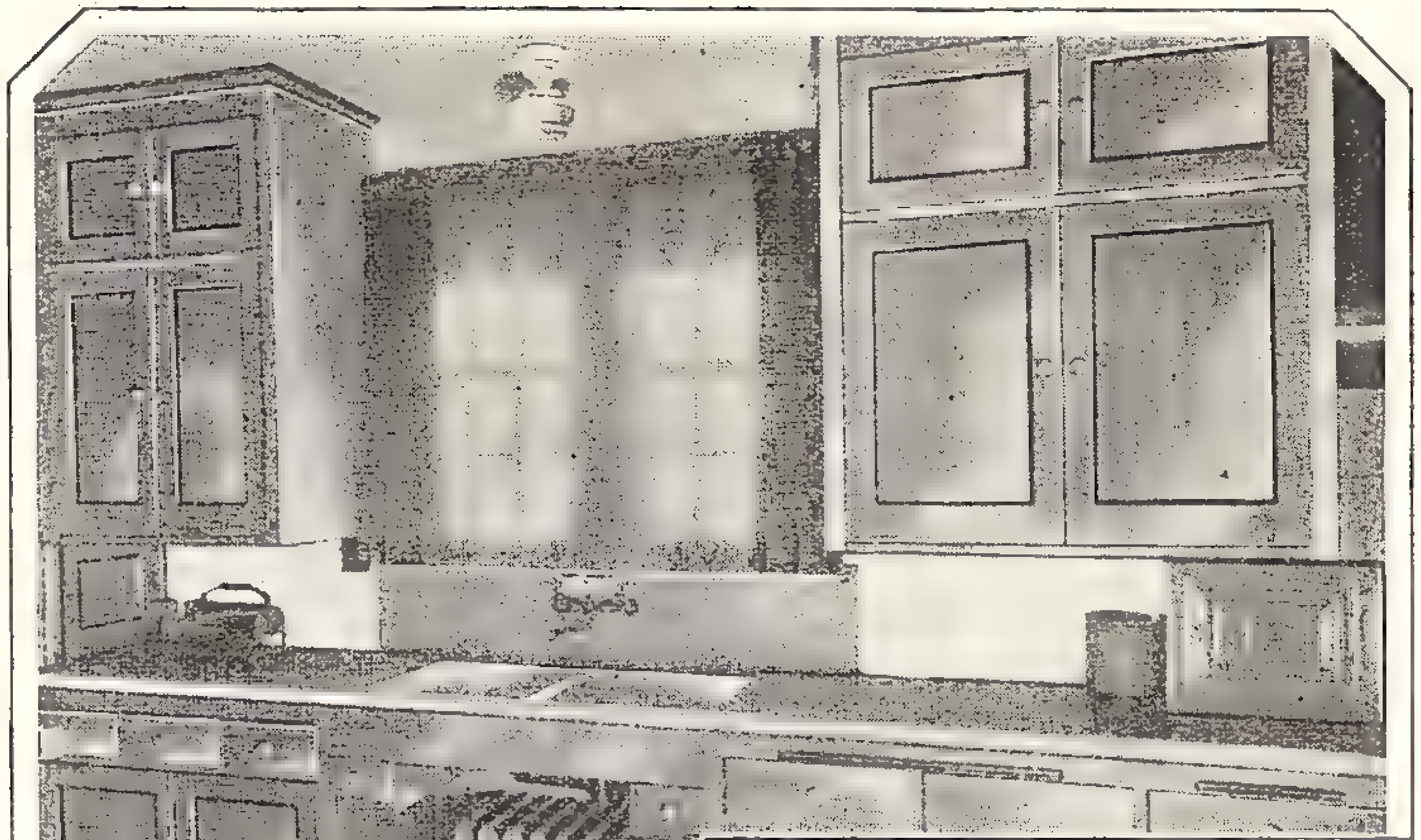
It is interesting to note that the kitchen space above the refrigerator is no longer wasted in the efficient kitchen but is utilized in the way depicted. This arrangement is thoroughly practical for the refrigerator may be slipped out of the enclosure without disturbing it as the grilled portion is a hinged door.

Built-in Wardrobes Are Popular

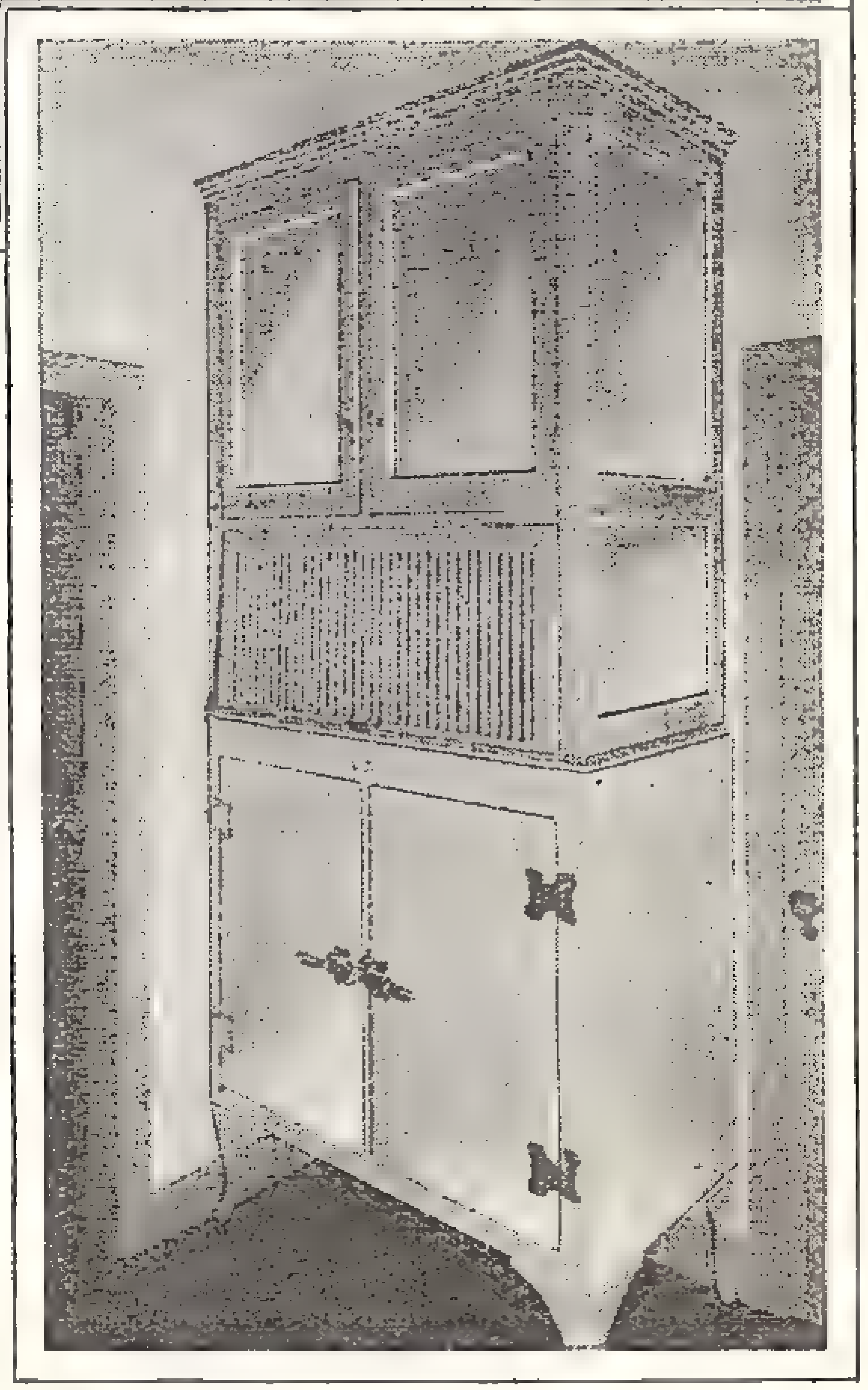
Built-in, cedar-lined wardrobes are proving very popular both in new and modernized homes. The usual arrangement is to have a space at the bottom for shoes and two shelves at the top for hats, the out of season hats going in the top shelf. The double doors to the right protect sliding tray-like drawers of varying depths.

Built-in beds are a convenience in the small home. By using one of them, it is possible to turn a living room, nursery, library, or den into a bedroom at a moment's notice. If desired, these beds can be equipped with box springs and be fully as comfortable as any others. After being made up they are folded back into a closet.

The bed shown is simple in arrangement, the springs being fastened on the door. When the bed is open, it rests on two sturdy, leather-covered stools which were built especially to support it. The room is furnished like a library with a large table and easy chairs. Thus, it does not reveal its double purpose to the casual observer.



There is plenty of room in these cupboards for all the necessary kitchen utensils. They are stained an attractive shade of green with the panels outlined in cherry red.



Cupboard built above refrigerator utilizes extra space.

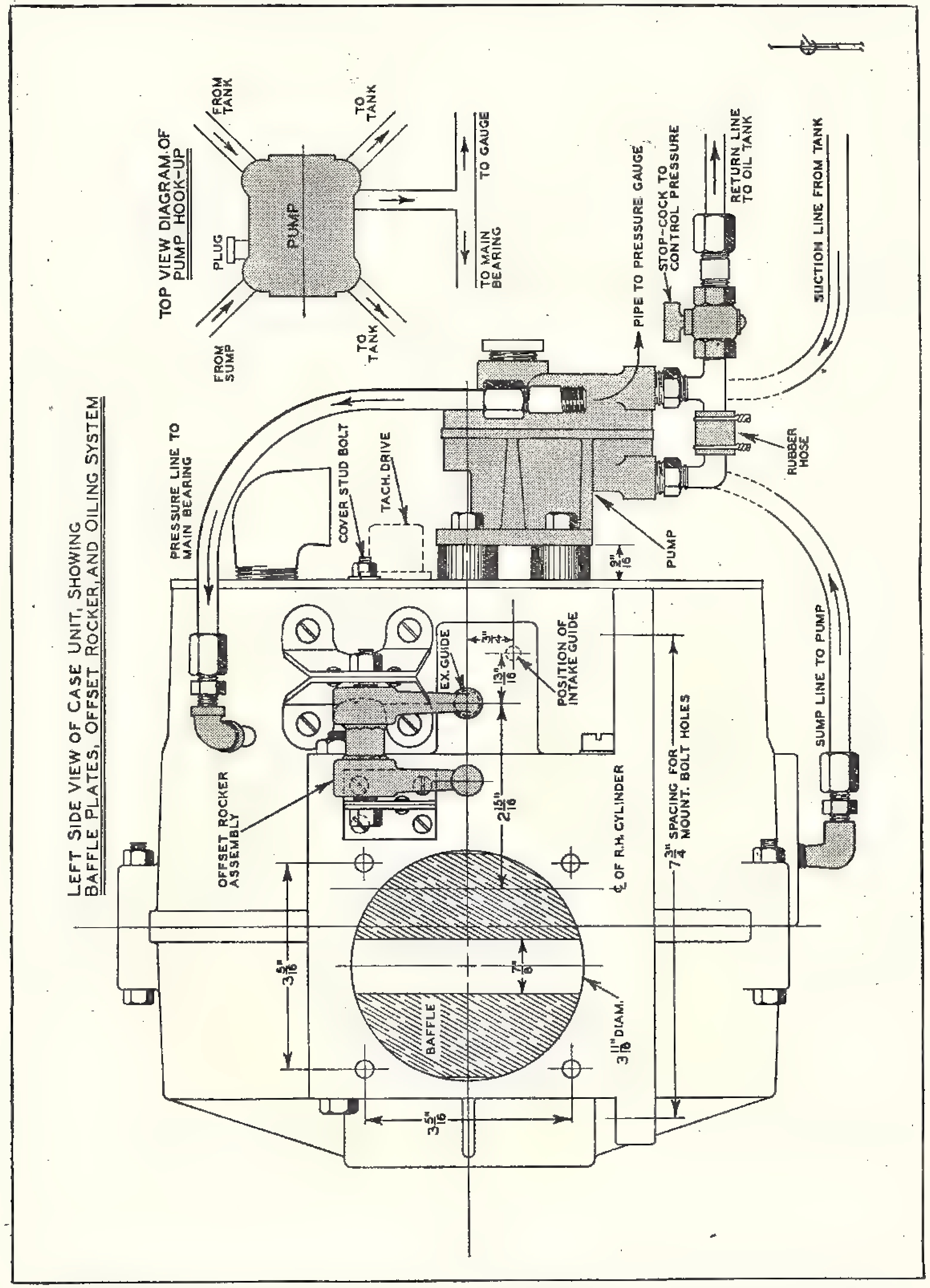
Today's magazines contain such valuable material that many people keep them. Unfortunately, magazines do not stay attractive nearly as well as books, so that it is well to have shelves for the older numbers, where they may be hidden from sight. The highly pleasing arrangement shown provides a desirable place for magazines and books that are no longer presentable. Doors and door frames are walnut with a formal design stenciled on them.

Built-in Features Add to Home Value

A home can hardly be considered up to the minute today unless it contains the features just described. Built-in features that are well designed add twice their cost to the value of a home, both in dollars and cents when it comes to selling and in the convenience that they afford.

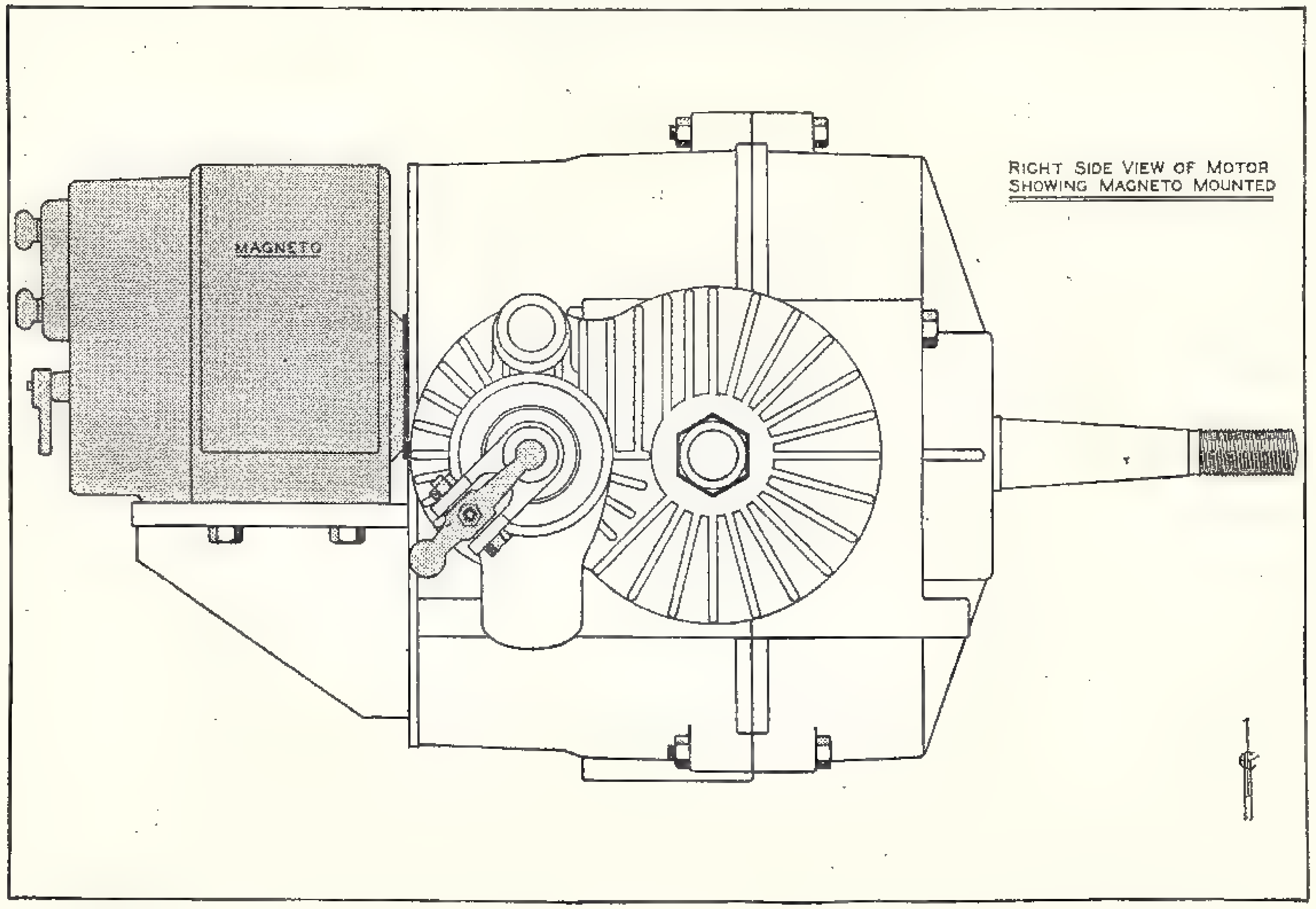
Fortunately, the home owner living in a house several years old may avail himself of any of the features described at little more cost and trouble than the owner can of the home under construction.

Oiling System Well Shown in This Drawing; Also Offset Rocker Assembly


LEFT SIDE VIEW OF CASE UNIT, SHOWING
BAFFLE PLATES, OFFSET ROCKER AND OILING SYSTEM
TOP VIEW DIAGRAM OF PUMP HOOK-UP
FROM TANK
TO TANK
FROM SUMP
TO TANK
PLUG
PUMP
TO GAUGE
TO MAIN BEARING
PIPE TO PRESSURE GAUGE
STOP-COCK TO CONTROL PRESSURE
RETURN LINE TO OIL TANK
SUCTION LINE FROM TANK
RUBBER HOSE
PRESSURE LINE TO MAIN BEARING
COVER STUD BOLT
TACH. DRIVE
PUMP
9/16"
EX. GUIDE
3/4"
13/16"
POSITION OF INTAKE GUIDE
SUMP LINE TO PUMP
OFFSET ROCKER ASSEMBLY
2 15/16"
℄ OF R.H. CYLINDER
7 3/4" SPACING FOR MOUNT. BOLT HOLES
3 5/16"
7/8"
BAFFLE
3 11/16" DIAM.
3 5/16"

The oil lines may be fully understood through this plan. Do not allow sharp bends in the tubing; 5/16 in. line is used throughout, with the usual fittings. Note the directness of lines to various parts of the motor. Use great care in fitting the offset rocker assembly into position. This is an unusual feature of the Harlequin and must be assembled with absolute precision. The position of the oil baffles is clearly shown and no difficulty whatever should be experienced with them.

Marvelously Compact, Clean Design of the Harlequin Shown in Side View


MAGNETO
RIGHT SIDE VIEW OF MOTOR
SHOWING MAGNETO MOUNTED

Compact arrangement of magneto in relation to motor shown in this outline view of the right side of the engine.

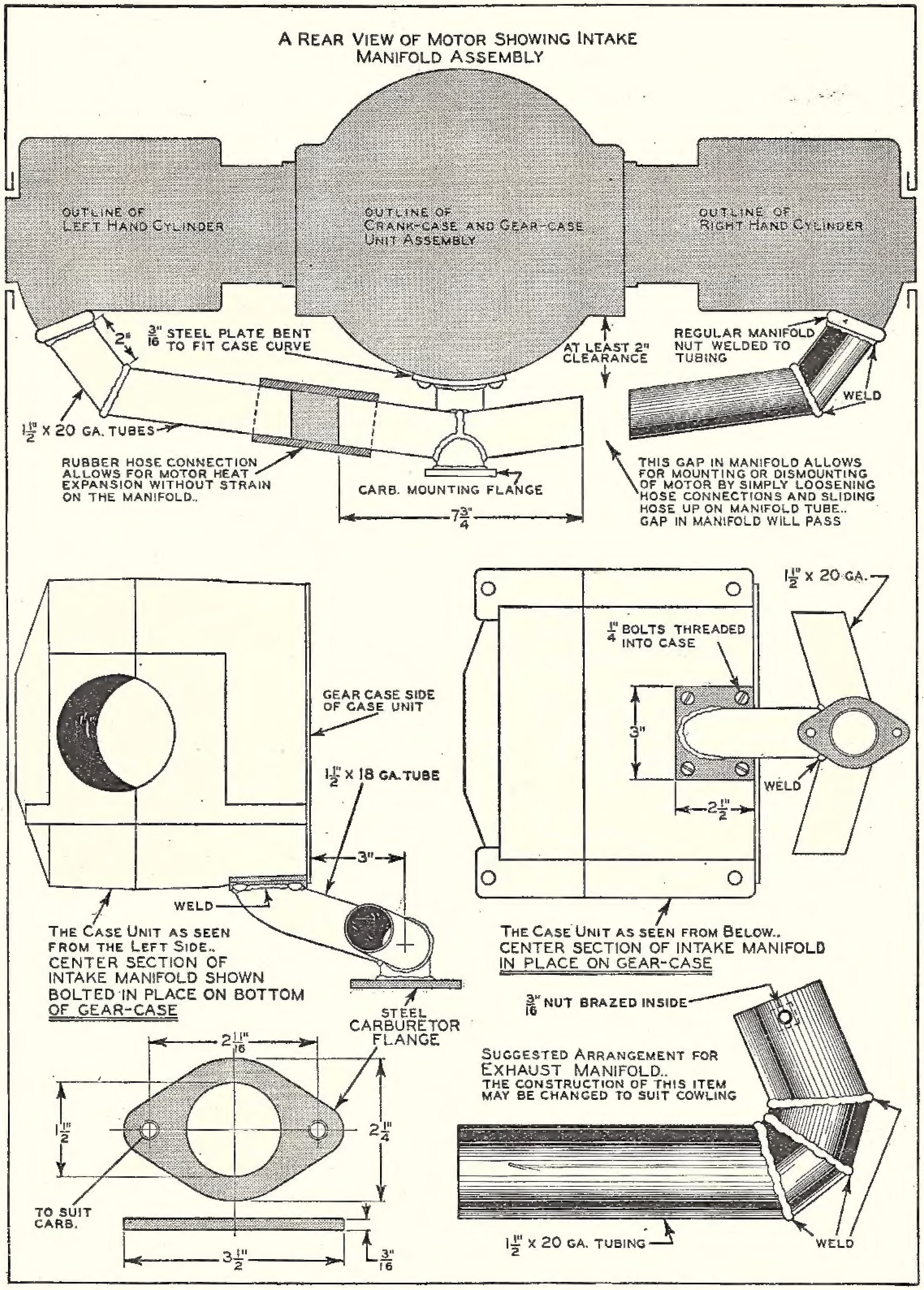
of the bushing in the cam gear. Simply take a ⅝" drill and run it a trifle over half-way through the gear, thus removing that part of the bronze bushing. Turn the end of the shafting so that it makes a very tight drive fit in the gear. Drive it in and then chuck up the gear and protruding shaft and finish the turning. This is so the shaft will be true with the gear. Check the gear carefully, both for center and for wobble. You will notice that there are two places where the shaft is square. Do this with a file, keeping these parts nice and truly square. It should be plain that this left hand cam gear bears partly on the regular cam stud and partly in the bushing in the cover.

Tap the hole for the breather. This is a plain ¾" pipe elbow. Make up the magneto bracket of ⅜" aluminum stock as shown and bolt it on. You will notice that we use a much simplified magneto drive arrangement, which is the reason we can use such a small and neat bracket. You may use nearly any type magneto you prefer. We use mostly Simms and Splitdorf. The type used will govern the style of the little gear extension fitting shown. The one shown is for the Splitdorf. The idea is to extend the gear far enough through the 1½" hole so that it will mesh properly with the R. H. cam gear. The end of the magneto must butt squarely up against the cover plate, with a felt washer between the two to keep it oil tight. If the magneto happens to have a rounded end, use an aluminum washer as shown. You will have to cut a taper hole in the extension fitting to fit the magneto shaft, and also two key seats, one for the shaft and one for the gear. You can make these with a file. After the magneto is fitted with its gear, which is also the regular Harley shaft gear, set it on the bracket and push the gear through till the two gears mesh properly. Then locate the holes on the bracket for drilling the magneto bolt holes. If the gears seem to bind, shim the magneto up slightly. The magneto used is a regular 4-cylinder type and of course runs at engine speed. This makes very easy starting. You will notice that there are no couplings, shafts, impulse couplings or other mess about this arrangement.

The drawings show two 3/16" holes in both the cover and gear case, one above and the other below the center. These are for studs to stiffen the cover plate. Simply cut two pieces of tubing having a 3/16" hole that will just reach from the case wall out to the cover. When making final assembly put these in place and slip a 3/16" bolt through, keeping the heads inside the crank case and the nuts on the outside of cover.

We can now drill the ring of holes to take the screws holding the cover on. Drop the cam gear having the pump shaft on the L.H. stud. Tighten the pump shaft bushing up snugly and drop the cover in

Ingenious Manifold Arrangement Makes Simple Job of Dismounting


A Rear View of Motor Showing Intake Manifold Assembly
Outline of Left Hand Cylinder
Outline of Crank-case and Gear-case Unit Assembly
Outline of Right Hand Cylinder
2"
3/16" steel plate bent to fit case curve
At least 2" clearance
Regular manifold nut welded to tubing
Weld
1½" x 20 ga. tubes
Rubber hose connection allows for motor heat expansion without strain on the manifold.
Carb. mounting flange
7¾"
This gap in manifold allows for mounting or dismounting of motor by simply loosening hose connections and sliding hose up on manifold tube. Gap in manifold will pass
Gear case side of case unit
1½" x 18 ga. tube
3"
Weld
The Case Unit as seen from the Left Side. Center section of intake manifold shown bolted in place on bottom of gear-case
Steel carburetor flange
¼" bolts threaded into case
3"
2½"
Weld
1½" x 20 ga.
The Case Unit as seen from Below. Center section of intake manifold in place on gear-case
2 11/16"
1½"
2¼"
To suit carb.
3½"
3/16"
3/16" nut brazed inside
Suggested Arrangement for Exhaust Manifold. The construction of this item may be changed to suit cowling
1½" x 20 ga. tubing
Weld

The principal point of interest in the design of this manifold arrangement is that in mounting or dismounting the motor, all that is necessary is to disconnect the two rubber hose connections and the gap left in the manifold will allow the motor bearers to pass easily. The drawing is self-explanatory. Exhaust manifold arrangement may be changed by the individual to conform to style of cowling chosen.

Direct Geared Drive to Magneto Eliminates Need for Shafting, Couplings

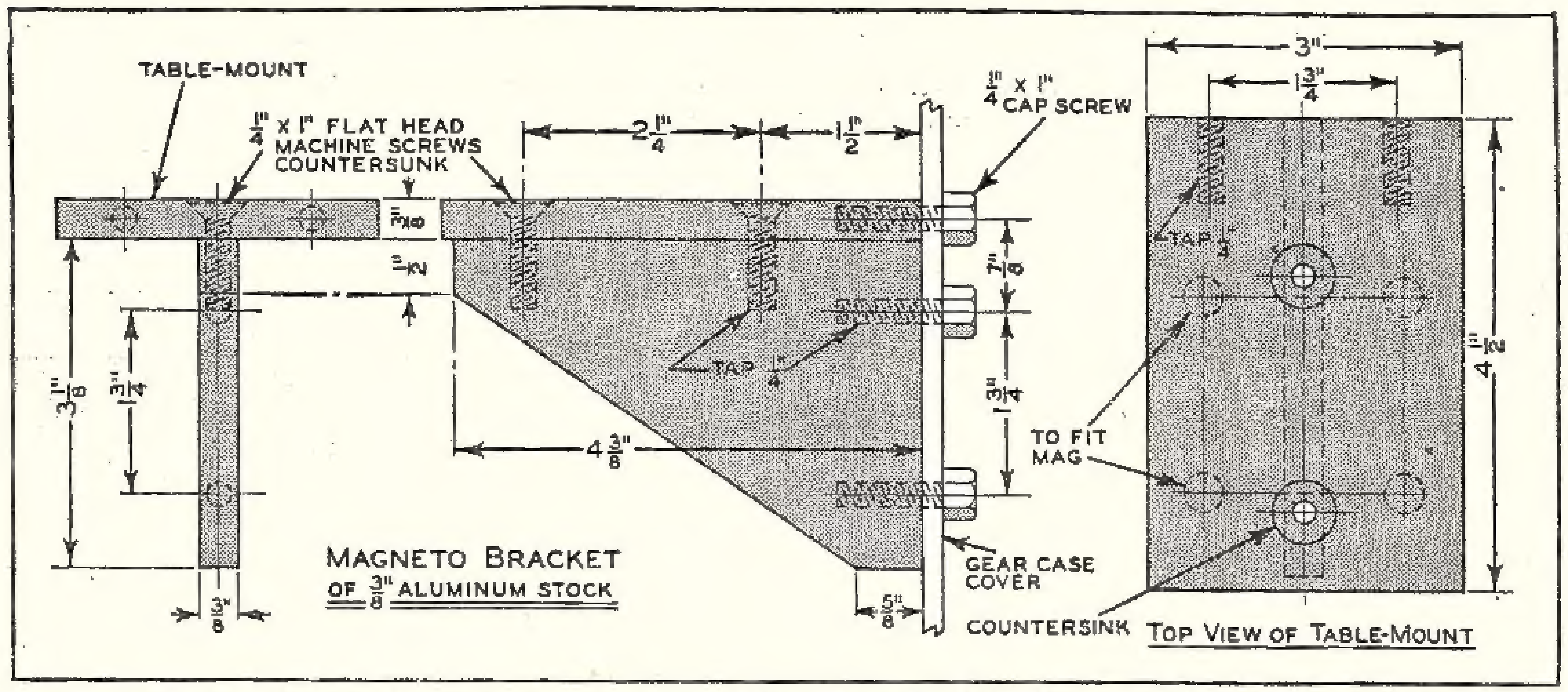


Table-mount
¼" x 1" flat head machine screws countersunk
2¼"
1½"
¼" x 1" cap screw
3/8"
½"
Tap ¼"
7/8"
3 1/8"
1¾"
1¾"
4 3/8"
To fit mag
Magneto Bracket of 3/8" aluminum stock
3/8"
5/8"
Gear case cover
Countersink
3"
1¾"
Tap ¼"
4½"
Top View of Table-Mount

Magneto bracket fits close to case, allowing direct geared drive without complicated arrangements.

place. If with the R.H. stud in its support, the pump shaft doesn't bind, everything is fine. Take it off. All around the gear case, on the outside make pencil marks opposite each screw boss. Replace cover and scribe an 8 15/16" circle. Opposite each of the pencil marks drill down through cover and into the case about 1¼". Use a 5/32" drill. Tap the holes in the case for 3/16" by 24 thread round head screws. Enlarge the holes in the cover to 3/16".

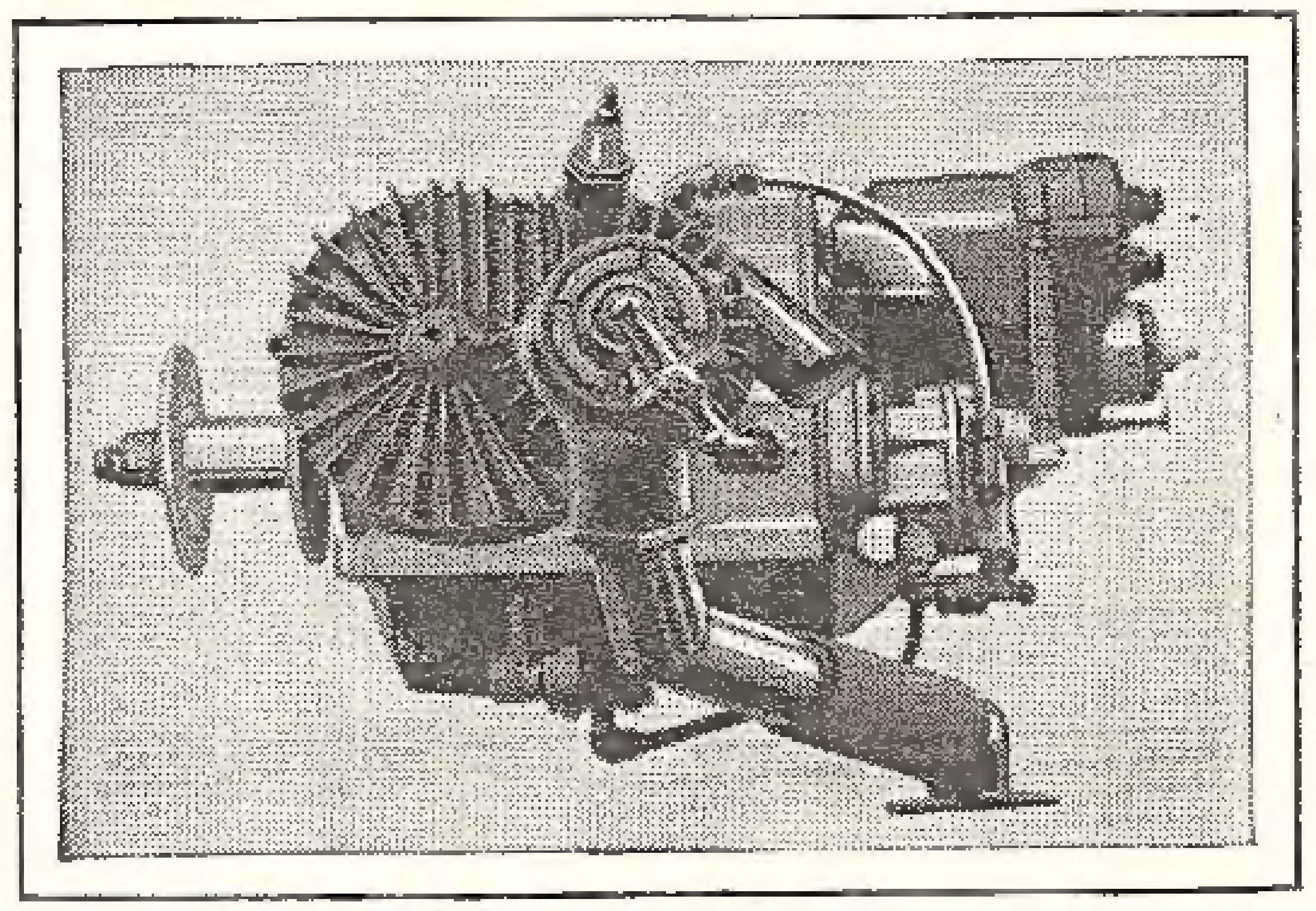
You will see in one of the drawings how the main oil line runs to the rear bearing. Drill a hole approximately in the position shown to pass ⅛" water pipe. Drill so that the pipe will just clear the case wall. Run a long drill down through this hole and drill and tap the bearing boss for the pipe as shown. At this time we will mention a detail that was purposely not mentioned. Where this oil line goes through the bronze bushing a groove about 3/16" wide and 3/32" deep should have been cut in the bushing. Do this with a boring bar. This groove is to carry the oil around the crank shaft so that the hole in the side of the shaft is always open to the oil. The hole in the boss and bushing, the groove, and the hole in the shaft must all register. The distance of all three will be approximately 1 inch back of the front end of the bearing boss. Use a little thought on this. At the top of the ⅛" pipe put an elbow and copper pipe coupling.

The oil baffles may be put in now. They are shown plainly and may be of aluminum, Dural or brass. Fasten them with 3/16" RH machine screws. Using these baffles there is no need for oil rings and the motor gets just the right amount of oil.

And now we come to the gadget that looks bad, but is easy to do. It is the special double oil pump we worked out here. The advantages of a dry sump engine are so many we decided that was what we wanted, so we made it that way. Dry sump engines are lighter, free from smoking when upside-down and have far less head resistance. The pumps are both in one unit. They are made of the regular Chevrolet pump. Get two of them at any wrecking house and with a saw and file trim the mounting bracket off one of them. The regular pump cover is as shown and the two pumps are placed face to face with the plate between them. Each part has its set of gears as usual, but you will notice that on the rear pump, which is the pressure part, the gear with the square hole is bushed so that it fits the squared end of the pump shaft.

This little bushing can be a strip of 20-gauge copper bent around in the hole and sweated in with solder. After the bracket has been sawed off the rear half the regular screw holes must be drilled clear through with a 3/16" drill. Ordinary stove bolts are used for assembling, going through the rear half and into the front half holding all together. Use the regular paper gaskets made for this pump. The pumps are from the older model Chevrolets. There are the regular packing nuts with the pumps. The rear one takes the shaft and is packed in the regular way. The front one is soldered shut as shown and screwed in tight. The pump is put on the cover after the motor is assembled,

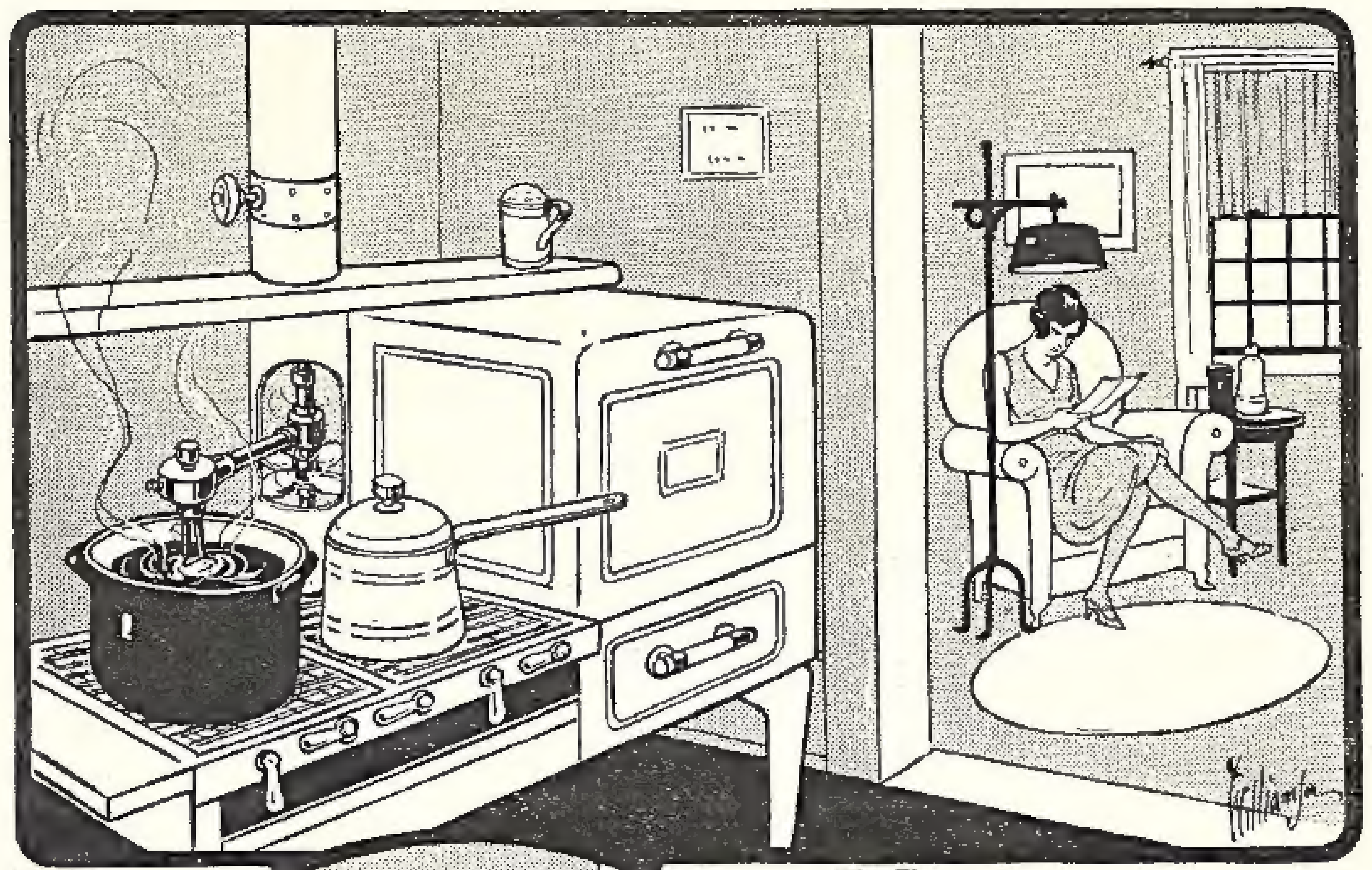
(Continued on page 134)



Side view of the Harlequin, showing all parts in place. Compare with the drawing on page 111.

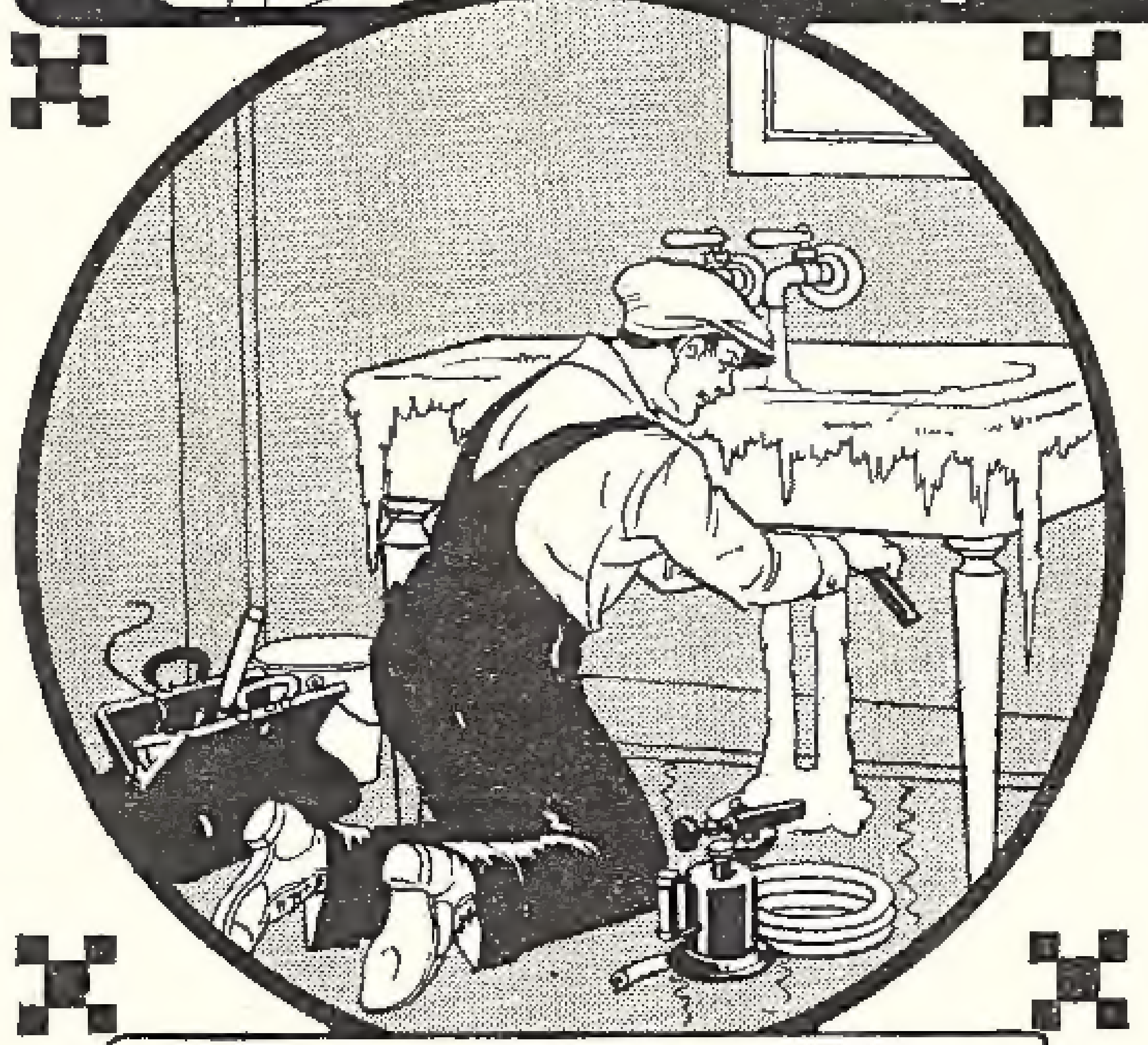
FORTUNE MAKING Ideas for INVENTORS

by RAYMOND F. YATES



A simple pot stirring attachment for the kitchen stove will win favor with millions of housewives and bring big rewards to the fortunate inventor.

Andrew Carnegie, the great steel king, once said that it is upon trifles that the greatest gifts of the Gods often hang. This is especially true in the field of invention. Ofttimes it is the simple ideas, such as those outlined here, that make the biggest fortunes. Get busy—see what you can do.



Millions of dollars in plumbing bills will be saved by the invention of a device that will prevent breakage of pipes when the bitter cold weather sets in.

Piano keys have a way of getting dirty and yellow with passage of time. What is needed to remedy this situation is some simple chemical compound for whitening the ivories and restoring their original lustre. The market is calling for such a preparation, so get busy you inventors.

TODAY is the inventor's day more than it has ever been in the history of mankind. We need new things, new ideas, better ways of doing old chores. Industrial paralysis such as we have been passing through finds its defeat ultimately in new ideas, new inventions.

Now is the time to invent, now is the time to reap the richest rewards. Pity those who think that times of depression are not for the inventor. They are his heydays.

1. *Automatic Pot Stirrer*

We have many and marvelous automatic machines in this great day and age, and yet housewives still stand over hot stoves to stir their pots and kettles. Why not a little device that could be set to do this and permit the housewife to go about her other work?

We have the energy in the form of heat in the stove itself and all we need is some sort of a little heat engine that will do the trick.

Specifications: This problem would be impractical if solved electrically for the simple reason that stoves are hot and insulation is perishable. The device should be thermal and the invention should be developed with the thought in mind that few people would want to pay over a dollar for it.

Exploitation: Should be sold entirely on royalty and the inventor should ask 4% of the gross. Only Americans would appreciate an invention of this sort and it should be patented in United States and Canada only.

2. *Anti-freeze Device*

Every year in the northern climates plumbers wax rich and millions of dollars are lost through freezing water pipes. It really seems as though there would be some method of permitting expansion to take place in pipes without their freezing. Perhaps some kind of a gadget placed in the water line would take care of the matter. At any rate I certainly do know that a mint of money could be made with the scheme.

Specifications: Should not cost over fifteen dollars and must be able to prevent pipes either from bursting after they freeze or from freezing in the first place.

Exploitation: Should be patented in all northern countries and sold on a royalty in each country.

3. *Making Piano Keys White*

I cannot help but wonder why some wise fellow has not developed a simple compound for whitening piano keys. I once tried to buy such a thing and found that it was not manufactured. Here is a fine opportunity to develop a fast working material that any housewife may safely use and that may be protected with a formula patent.

Specifications: Should be made to sell for twenty-five cents and enough should be placed in each can or package to permit cleaning the keys at least a dozen times. The material should not only function in connection with pure ivory keys but it should also be effective in connection with the cheap celluloid substitutes.

Exploitation: This should be patented in all of the leading countries of the world and sold on royalty.

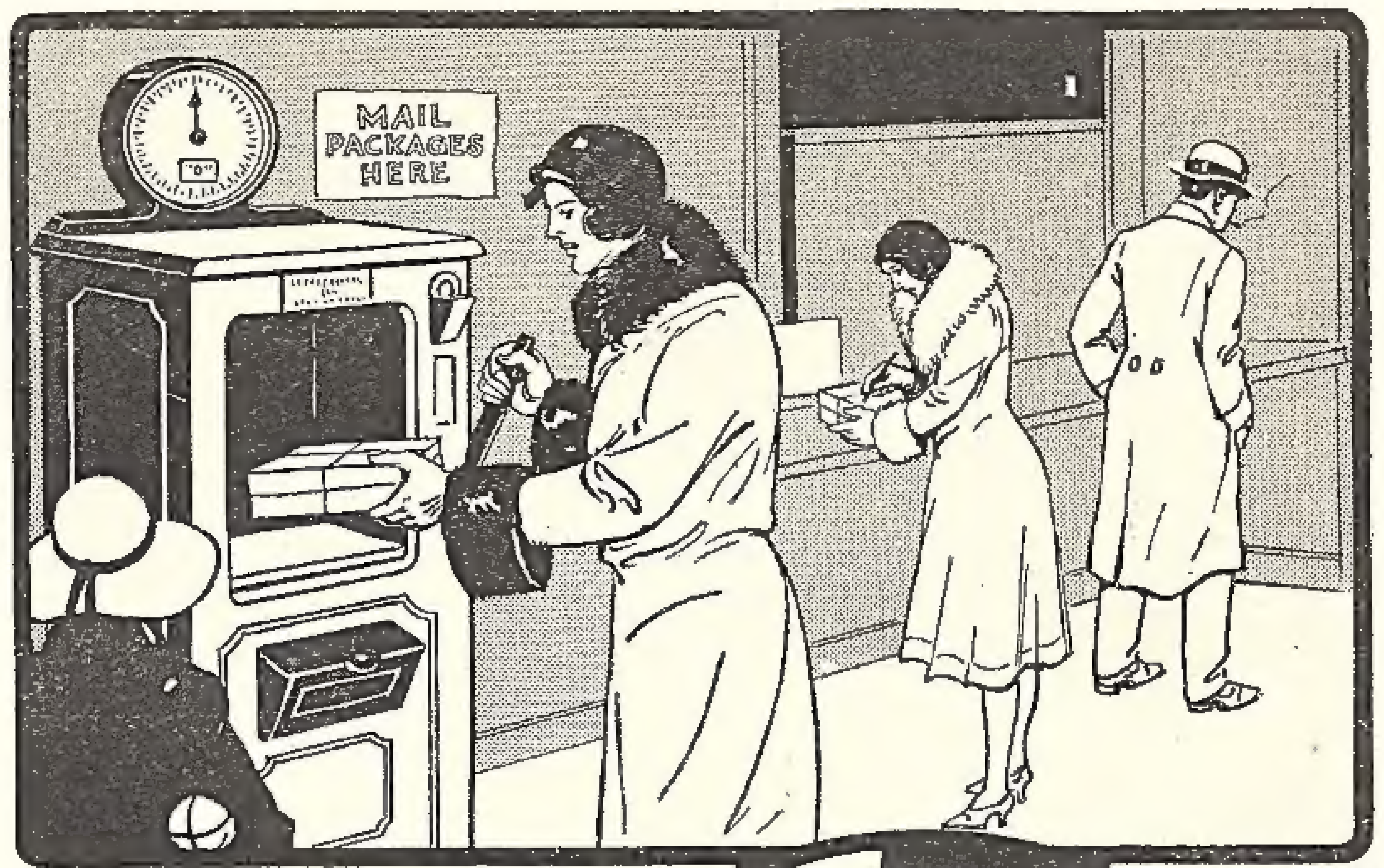
4. *Automatic Postage Machine*

Our post offices are always closed on Sundays and holidays. What is needed is an automatic postage machine into which we

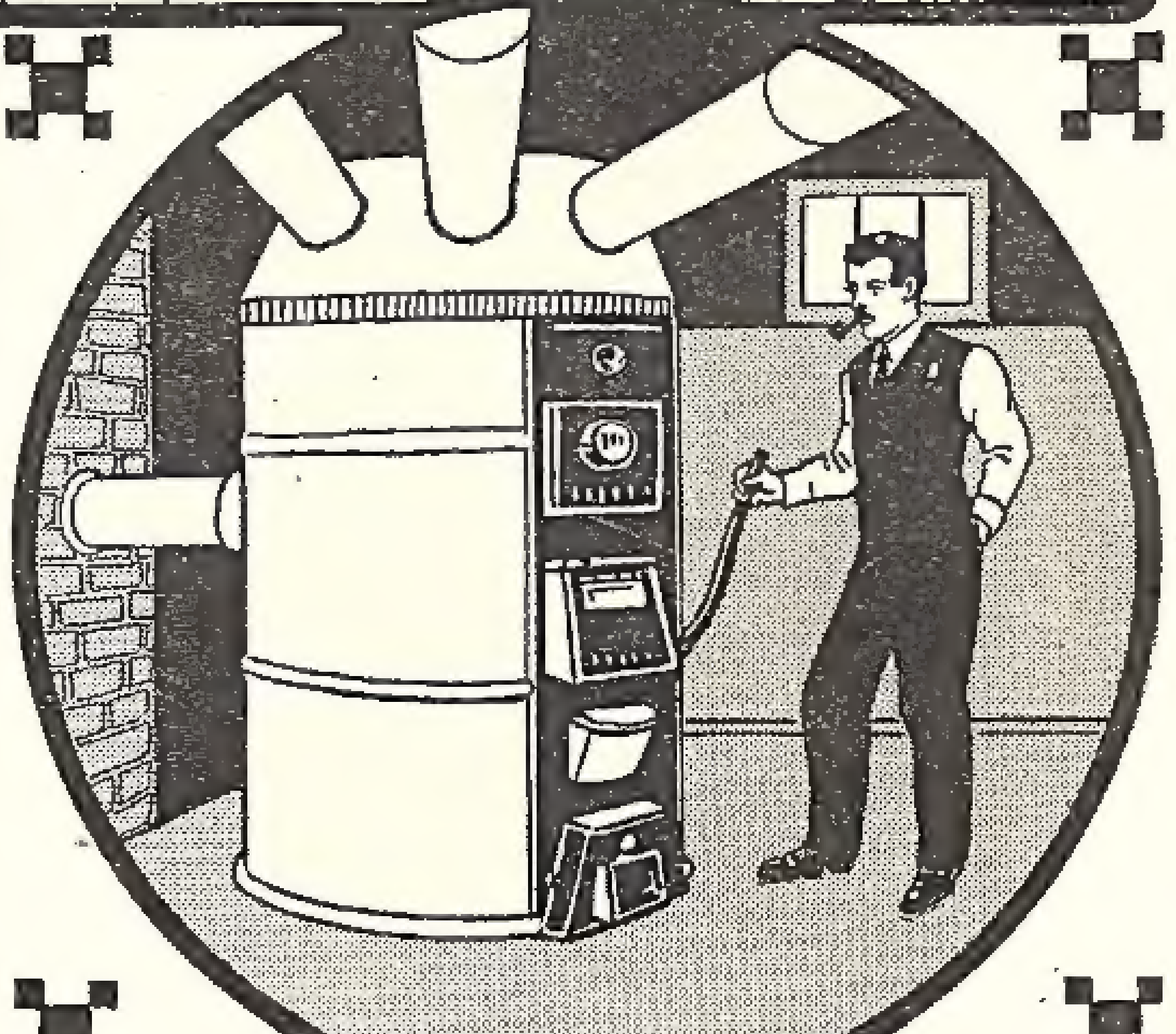
(Continued on page 140)

INSTRUCTIONS TO INVENTORS WANTING ADVICE

Mr. Yates, who conducts this special department for inventors, stands always ready to give expert advice on patent law and marketing procedure to Modern Mechanix and Inventions readers. When requesting advice, however, do not send models, as they will not be accepted. Your requests will be taken care of promptly and adequately if you merely send a clear drawing and complete constructional and operating data. Stamped return envelope must be enclosed. Address Mr. Yates in care of Modern Mechanix and Inventions, 529 So. 7th St., Minneapolis, Minn.



Machines that will weigh and stamp packages or letters on Sundays and holidays will prevent delay in handling mails for the impatient public.



Considerable savings in coal bills will be made by the invention of an automatic soot remover. The only operation necessary to clean the pipes should be a pull of a lever.

Nothing is more attractive than a waxed floor, yet nothing is more dangerous. Won't some kind-hearted inventor get busy and develop a material which will polish the floor to a high shine, but at the same time leave a non-skid surface, which won't be a menace to everyone.

“ALL SORTS”—an ALL-PURPOSE BOAT

by WESTON FARMER

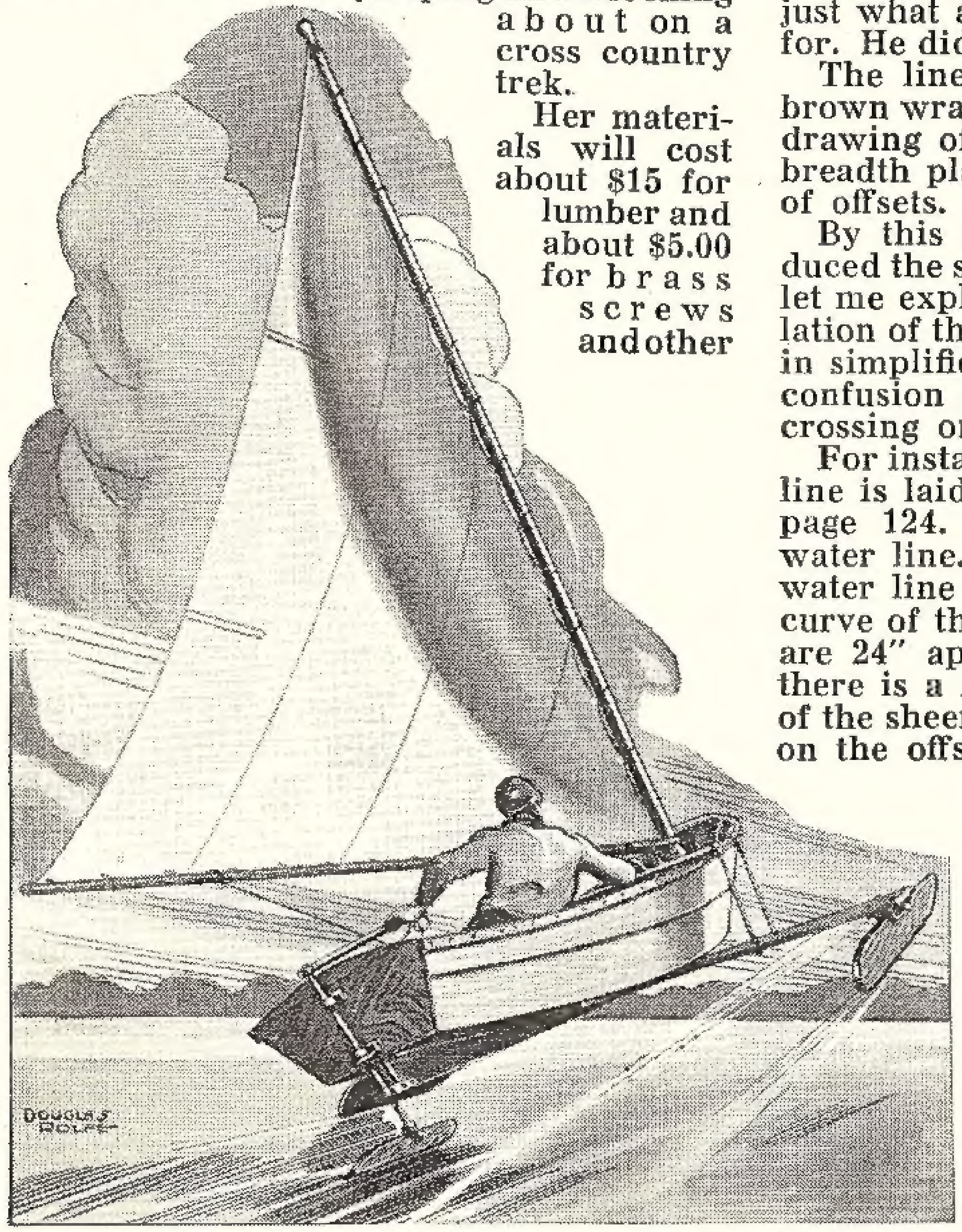
This is a he man’s boat suitable for any kind of service—row it, power it with an outboard, sail it, or adapt it to iceboat service with its clever fitments. “All Sorts” is in keeping with the times—she gives you more for your money.

SOME years ago I built a little boat that was quite dandy for use as a dinghy. She was a combination sailer, rowboat, or tender. Being portable she could be thrown onto any old pair of wheels and be trekked to parts unknown for high adventure.

As I used her I found that this point could be improved, and that point, and so I resolved one afternoon while sailing on Ottertail Lake in Minnesota to “git behind th’ new project an’ shove.” So I did. The resulting design is shown right here. Her name is “All Sorts.”

This final evolution is a grand little boat. She is ten feet long, and 44 inches beam—very generous width for a boat so small. She will weigh less than 60 lbs. and is therefore portable. Because of her construction, which is typical of the Long Island longshore boats, she is very very rigid and stiff and will take a lot of jumping and knocking about on a cross country trek.

Her materials will cost about $15 for lumber and about $5.00 for brass screws and other hardware. The sail can be had here for ten bucks if you want to buy a brand new one from the magazine, and the iceboat attachment will cost according to the going wages for local blacksmithing in your community.



“All Sorts” as an iceboat. With a minimum of extra gear this fine little sailboat can be adapted into a really fast iceboat in which one man can ride.

“All Sorts” lays her chief claim to fame in her versatility. She is at once a portable fishing and rowing skiff, or an excitingly capable little sailboat, or an outboard, or an iceboat.

Here is how she was built.

After the idea was reduced to drawing form, I decided to build one of these little critters to see how she’d work out. At the Mechanical Package Magazine Experiment Station Sam Wing and Maurie Lonn were equipped for a job like this, and I asked my brother editor, Don Cooley, who runs this yere M-M book, if he didn’t think he’d like to build up “All Sorts” to show his readers just what a swell little boat could be used for. He did. So we started work.

The lines were laid down full size on brown wrapping paper. In other words the drawing of the sheer profile and the half breadth plan were laid out from the table of offsets.

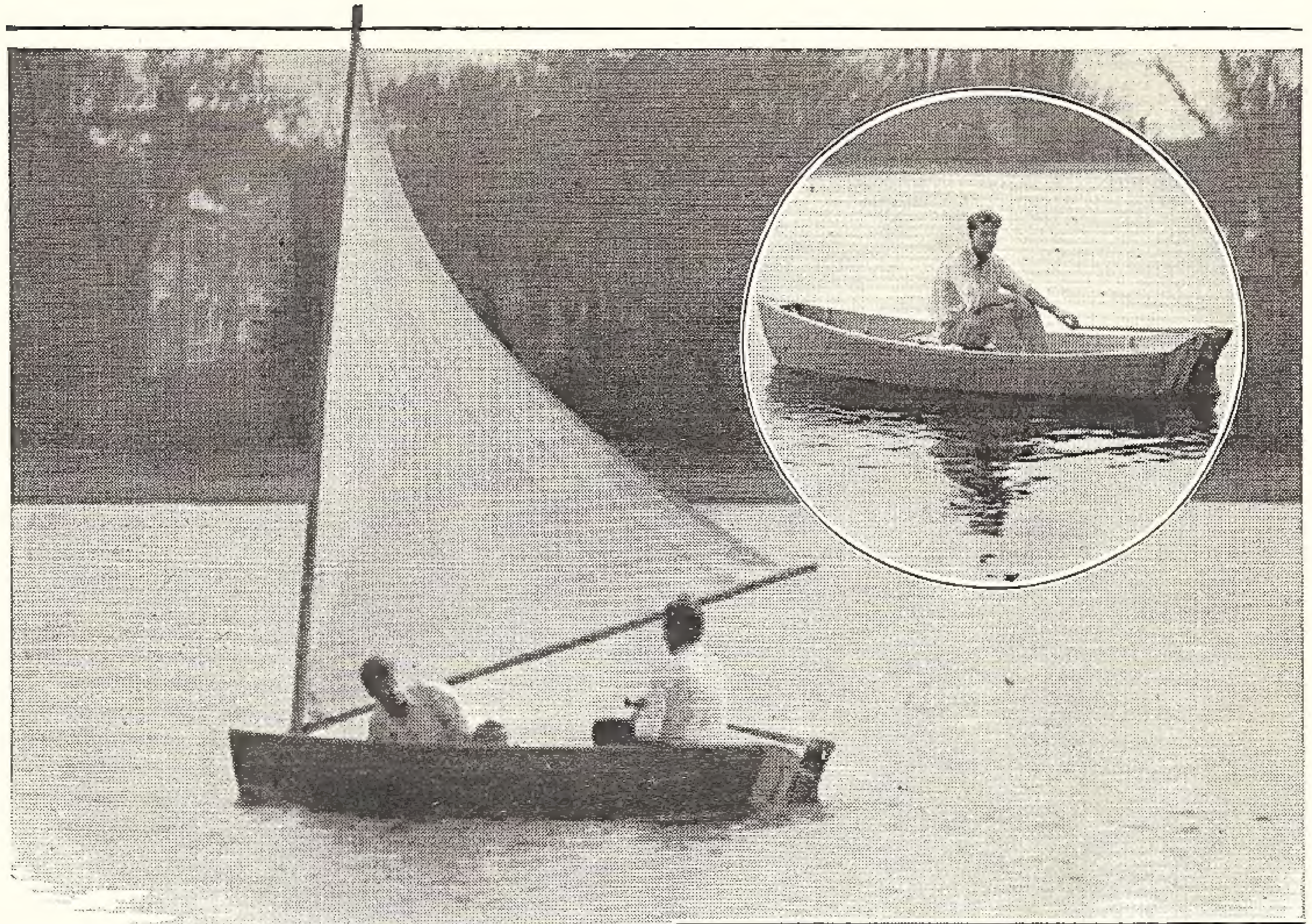
By this means the drawing was reproduced the size of the boat. The offsets table, let me explain, is no mystery. It is a tabulation of the dimensions of the frames done in simplified style. Thus it avoids a lot of confusion of dimensions crossing and recrossing one another.

For instance, you can see where the baseline is laid out on the profile drawing on page 124. Six inches above this is the water line. Then six inches above this is water line No. 1. The dimensions for the curve of the stem are shown. The stations are 24" apart. On each of these stations there is a *height*. For instance the height of the sheer line at station No. 1 reads 1-8-4 on the offsets table. This means that the dot through which the sheer line must pass on station 1 is 1 ft. 8 ins. and 4/8" (or ½" in other words) from the baseline.

At station 2, the height of the sheer above the baseline is 1-5-5, or 1 ft., 5 ins. and 5/8" as all dimensions in the table are ft.—ins.—8ths.

By following out this reading of the offsets table the full size set of lines is laid down.

These lines must be laid down. One cannot build a fair boat without the full size line drawings.



The inset shows “All Sorts” as a plain tender or dinghy. As such she’ll make a portable little rowboat or fishing boat. Left center shows her with two aboard sailing on The Lake of the Isles, Minneapolis. She furnishes splendid sailing.

One word of explanation: If the batten you use to draw around will not bend through each point given in the offset table *fairly*, average the lineup—fair it up—the offset table can be and very often is wrong. The whole purpose of the laying out is to fair the boat up on your own floor before you use the full size drawing for patterns for the molds and for the stem.

Stem Is Next

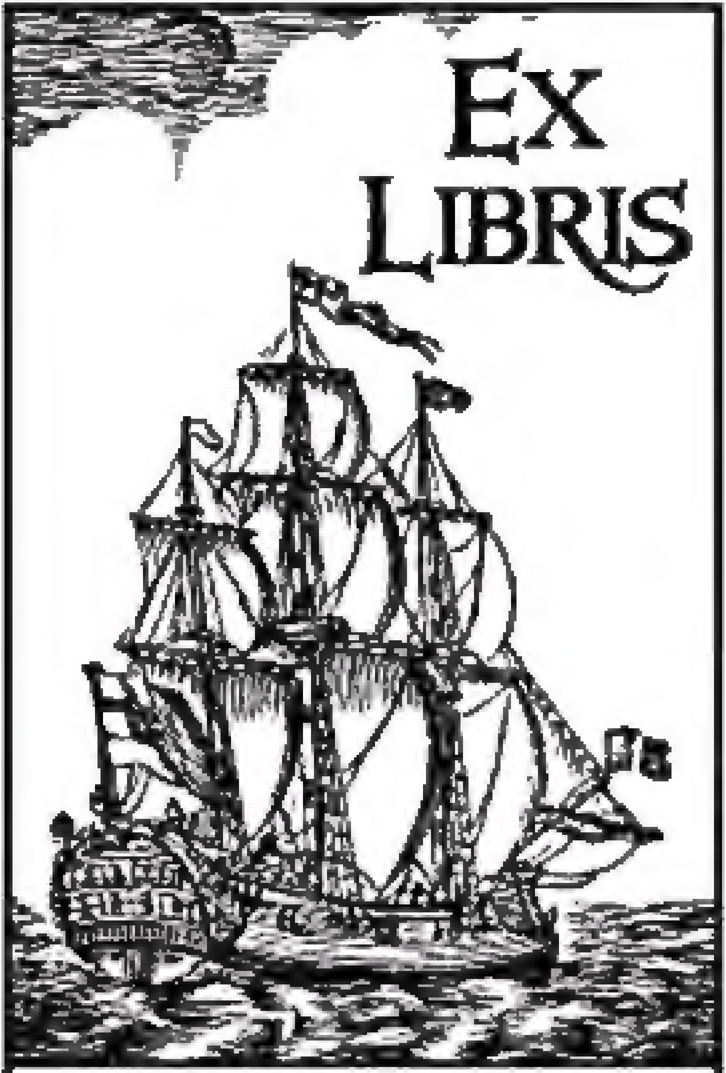
When the lines are laid out, cut out the stem just as we did. This is a piece of 1¾" thick white oak. A piece 1¾" by 8" by 2' will give a piece for the stem. Lay this piece under the lines drawing and drive brads through the stem profile. Then pull the brads out. This will show a pattern of nail holes which can be sawed to shape on a bandsaw, or by hand.

Then cut in a rabbet, just as we did, by making a fid as it is called, just the thickness of the topside planking of the boat, and setting it into the wood at the right angle, the depth equal to the thickness of the planking.

The author at the left and Hudson Keith, of the Packmag Experiment Station, launch the boat at the door of the Station. Just like dunking a doughnut!

Next, as shown in Fig. 1, arrange a strongback of 2x12" scrap lumber which is fairly straight. Space off the stations, and make temporary molds from the lines drawings of the sections. It is around these molds that the planking is bent. The thickness of the planking, ½", must be subtracted all around the mold, as the drawing is to the outside of the hull. Then your setup will look like the photo, Fig. 2.

The transom is made of ¾" mahogany or oak, well cleated together and fastened



Anon. Malefactor